THE POLAR TIMES

Photo by Keith Mountain

Secretary's Letter

The First American Polar Society Symposium was a resounding success thanks to the hard work of many people too numerous to mention. The Byrd Polar Research Center did an outstanding job of providing for the motels, buses, box lunches, lecture hall etc.; special kudos to Ken Jezek, Lynn Everett and Lynn Lay. All the speakers came from afar at their own expense to make presentations and deserve a special thanks. Keith Mountain stepped in at the last moment and provided the photography, and Della Weston provided the art work for the honorary medallions and certificates. They deserve special recognition. I'm sure that there were others.

During the awards banquet many took up the rallying cry of "Colorado 2000" for the venue and time of the next APS Symposium. I need your thoughts and sweat if we are to outdo ourselves in two years.

There are now 32 Honorary Members in the Society; that is an average of one every two years since 1934 when we were chartered. There are many deserving polar scientists and explorers out there who would qualify for Honorary Membership, but they will not be selected if no one submits their name and biography. Send them to me, and I will see that they are put before the Board.

Please note the address change. The Society headquarters moved with me to North Bend, Oregon, in September.

Again thanks to all who wrote and clipped articles. There would be no *Polar Times* without you.

Sincerely

Brian Shoemaker

Editor's Letter

Overheard in the van from the airport to our symposium in Ohio: "I've never been to a conference before where I listened to speakers—for two days in a row, from eight in the morning until eight at night—and just didn't want it to end."

My sentiments exactly.

Della

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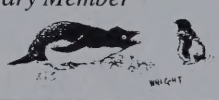
OUR COVER: *Honorary Member Kenneth Utuayuk Toovak addresses the APS Symposium.*



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BRIAN SHOEMAKER, Secretary
P.O. Box 591, North Bend, OR 97459
Ph 541-756-9013 • Email:apolars@presys.com

DELLA WESTON, Editor

The American Polar Society was founded Nov. 29, 1934, to band together all persons interested in polar exploration. Membership dues are $15 a year ($17, foreign), and entitle members to receive *The Polar Times* twice a year. The American Polar Society is classified as a tax exempt organization under Sec 501(C)3 of the IRS Code.

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About Your Annual Dues

The Board of Governors has examined the dues structure of the Society and has changed the dues for 1999 as follows:

Annual Dues Rate $15.00; Foreign $17.00
Library Dues Rate $20.00; Foreign $22.00
Annual Corporate Rate $100.00
Life Membership $150.00; Foreign $170.00

The Board also voted to increase the dues by another $5.00 and Life membership to $200.00 in the year 2000.

For ease of administration we ask for annual dues to be submitted at the end of each calendar year, and we include a remittance envelope with the Fall/Winter issue of *The Polar Times*.

Since many of you send in your dues several years in advance, we tag your contributions to our membership files in our computer. This tag prints out on your membership sticker that we place on the envelope for *The Polar Times*. If it reads "expires 1298," then your membership contribution is due on January1, 1999. If it reads "expires 1297," you are in arrears! If in doubt, send in your contributions, and we will credit your account by advancing your expiration date. We will honor all dues paid in advance at the old rate, but upon expiration the new rates apply.

Multiple year contributions are welcome as are donations. We are a tax exempt organization as defined by Sec 501(C)3 of the IRS Code. ❑

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The Polar Times
American Polar Society • Fall-Winter 1998

Cover Story

Polar Pioneers

APS Symposium salutes those who led the way to the Poles at BPRC.

by Brian Shoemaker

The Byrd Polar Researchg Center of The Ohio State University served as host to the first ever American Polar Society Symposium from October 8-10 in Columbus, Ohio. About 160 attended the three-day event featuring 21 presentations by distinguished polar explorers and scientists. The closing ceremony was an awards dinner on the 10th where sixteen men were presented medallions for distinguished polar service.

Seven men and women in attendance had polar careers that began in the 1920s and 1930s— careers twice as long as Amundsen's and three times as long as Shackleton's. The dean of this group was Norman Vaughan who drove dog sleds for Admiral Byrd in Antarctica in 1928 and 1929. Others included Graham Rowley who first went to the Arctic in 1935 and lived with the Inuit while unearthing the Dorset Culture at Igloolik as well as Charles Passel who developed the Wind Chill Chart at Little America in 1939. Capt. David Nutt began his Arctic career under the legendary Bob Bartlett who was Admiral Peary's sailing master (see accompanying photo). Kenny Toovak, an Inupiaq, born at Point Barrow, has participated in exploratory research expeditions for over 50 years (see cover photo).

PHOTO BY KEITH MOUNTAIN

Tahoe Washburn awards Honorary Membership Medallion to husband Lincoln Washburn on behalf of the American Polar Society.

Perhaps the most intersting were Link and Tahoe Washburn, who went to the Arctic soon after they were married in 1936 and who have been partners in polar field research ever since (see accompanying photo). The Washburns plan to return to the Arctic on another expedition in the summer of 1999.

Others careers began in the 1940s with the advent of the Cold War. Col. Joe Fletcher directed weather reconnaisance throughout the Arctic in the late 1940s and pioneered the use of ice stations as support bases for science. Beau Buck and Max Brewer working from the Naval Arctic Research Laboratory built a series of ice stations in support of Navy research needs in the central arctic ice pack.

The International Geophysical Year of the late 1950s first drew others to the poles. Capt. Bill Anderson sailed the submarine *Nautilus* across the Arctic under the ice pack and VADM Jim Calvert surfaced the *Skate* at the North Pole setting the stage for year-round submarine operations in the Arctic Basin. Dr. Charles Bentley led geophysical traverses about the Antarctic in the mid 1950s as did Dr. Bob Rutford in Greenland. In 1955, Dr. Wilford "Willy" Weeks began his career studying sea ice and eventually participated in 45 research expeditions in the next 40 years.

Most of those in attendance focused on the polar regions for their life's work and were totally dedicated to their professions without fanfare. However, they have left an enduring legacy—a system of logistics and support bases that enable scientists and others to expeditiously visit and work in the polar regions; gone is the need to struggle for survival at the expense of science and other work. Aircraft were developed that could fly anywhere and land in the field; witness the flight of RADM Jim Reedy from South Africa across the Antarctic Continent to McMurdo in the early 1960s.

They also perfected man's ability to live and work permanently in the most extreme regions—witness the Pomerantz Center at South Pole, one of the most sophisticated astronomical observatorities in the world, named for symposium attendee Dr. Martin Pomerantz, who began conducting cosmic ray studies in the Arctic over 50 years ago.

PHOTO BY KEITH MOUNTAIN

Captain David Nutt gives presentation on small-ship research in the Arctic.

Most importantly they have inspired and groomed a cadre of young men and women who have followed in their footsteps and are making careers in the Arctic and the Antarctic—a living legacy that will survive in perpetuity.

The symposium was designed to salute all of the Polar Pioneers who attended. The sixteen men heretofore mentioned received Honorary Memberships in the American Polar Society, joining Admiral Byrd, Lincoln Ellsworth, Vilhjalmur Stefansson and others who were formerly honored (see back cover). In addition, Capt. David Nutt was awarded the Elisha Kent Kane Medal that has been presented to polar explorers since 1920, and the Byrd Polar Research Center presented the Goldthwait Medal to Dr. Charles Bentley for exemplary field research in Antarctica for over 40 years.

There were numerous others with long distinguished records present. One of them spoke for all, saying that he "felt honored to just have been invited to the symposium. It was huge success." ❑

(Secretary's note: A photo brochure of the symposium is being edited and will be mailed separately.)

Global Distillation

***Polar Whispers* (News of the New Zealand Antarctic Society), May 1998, Issue 11, p. 1**—In a recent *Antarctic* (vol. 15, no. 2, p. 34), attention was drawn to the very high levels of toxin in Antarctic seabirds discovered by a Dutch study. Pollutants released in warmer climates are believed to vaporize and rise into the upper atmosphere, to later condense and fall as precipitation at the poles, contaminating the ecosystems and food chains. The process is known as Global Distillation. Seabirds are most severely affected by this pollution because they sit at the top of the food chain.

A similar concentration of pollutants has been reported in northern Canada as a result of a six-year study by McGill University of Inuit children and nursing mothers in small whaling communities. People throughout the Canadian north were found to have very high concentrations of Polychlorinated biphenyls (PCBs) despite being thousands of kilometers from likely sources. It became apparent that the chemicals had become concentrated in the skin and blubber of beluga and narwhal whales, which are favorite foods of the Inuit people.

Concentration of contaminants at the poles can happen surprisingly fast for it is believed that highly volatile chemicals can travel through the air from India to the Arctic in as little as five days. Despite proximity to toxic sources, measures of volatile chemical concentrations in the tropics may be very low, but rise dramatically, flow poleward, concentrate with increase in latitude so that in the Canadian north levels are 100 times higher.

Even when tighter controls are imposed on Persistent Organic Pollutants (POPS) and heavy metals, it will be many years before things start improving in the Arctic.

Other polar pollutants may not take such a circuitous route. A New Zealand program working in the Ross Sea region some years ago recorded the presence of small polystyrene beads on many of the Victoria Land beaches, carried south by ocean currents. Polystyrene is commonly shipped around the world in the form of small, compact beads before the material is expanded to form the ubiquitous light, porous polystyrene foam used as a protective, insulative and molded packaging for electronic equipment. Spilled from paper sacks during the unloading of ships, the beads float easily. Because the beads are indestructible, it is alarming to see them on Antarctic beaches.

When certain pollutants appear in Antarctica it is a clear early warning signal that pollution over the rest of the world has become a significant problem. ❑ **(cb Peter Barretta)**

Biggest Quake This Year Rocks Antarctica

***Antarctic* (New Zealand Antarctic Society), Vol. 16, No. 1, 1998, p. 7**—The biggest earthquake in the world so far this year, measuring 8.1 on the Richter scale, was recorded on 25 March 1998 at 3:11 p.m. NZT in Australia's Antarctic Territory, just off the Balleny Islands about 2000km south of New Zealand.

Seismologist Dr. Ken Gledhill of the Institute Geological and Nuclear Science said, "This is a big, big earthquake—slightly bigger than the 1858 Wairarapa quake that caused sideways movement in the ground of 12m and an uplift of about 6m. It was also larger than the earthquake that struck Napier in 1931 that measured 7.9 on the Richter scale."

Nothing was known about how much damage it would have caused to the physical environment in the quake's impact area, but, according to Dr. Gledhill, it would have broken a lot of earth.

Had it happened near urban populations, the quake would have caused a major disaster. The quake that struck the Japanese city of Kobe in January 1995, killing about 6,000 people and injuring 35,000, was 7.2 on the Richter scale. ❑ **(cb Peter Barretta)**

Antarctica May Point Where Climate's Going

Researchers analyzing ice samples say they see a link between temperature variations in Antarctica and Greenland

***The Oregonian*, 20 August 1998, by Joseph B. Verrengia (AP)**—Antarctica might be an important predictor of climatic changes elsewhere on Earth thousands of years before they appear, researchers say.

Analyzing ice cores drilled from deep within glaciers, researchers found that small temperature increases in ancient Antarctica preceded, by at least a millennium, extremely rapid, substantial warming in Greenland.

The study, to be published today in the journal *Nature*, "contradicts the hypothesis that Antarctic warmings are responses to events in the Northern Hemisphere," said Thomas Blunier of the University of Bern in Switzerland.

By deciphering these frozen traces of events that occurred more than 20,000 years ago, scientists could gain a better understanding of Earth's climate and possible global warming events today.

Blunier's findings "move us closer to the ultimate goal of predicting future climate changes," said James W.C. White, a climatologist at the University of Colorado who has drilled and studied ice cores from both polar regions.

In Blunier's study, a team of researchers from Switzerland, France, Denmark and Iceland examined slices of ice drilled from a glacier in central Greenland 650 miles north of the Arctic Circle. They then compared the slices with samples drilled from two locations in Antarctica.

Much like rings in a tree trunk, ice cores are thought to be a calendar of climate variations because each year's snowfall is deposited in a distinct layer. Atmospheric chemicals, dust and bubbles trapped in the ice enable scientists to reconstruct climates of the past.

Blunier's group examined levels of methane, a heat-trapping gas, and found that temperature fluctuations in Antarctica began about 47,000 years ago and lasted for 24,000 years. In Greenland, the temperature swings began roughly 45,000 years ago, persisting for 9,000 years.❑ **(cb unknown)**

NSF Names New Head Of Polar Programs

Photo Courtesy of SF, Division of Polar Programs

The National Science Foundation (NSF) has named physicist Karl A. Erb to head its Office of Polar Programs. Erb assumed is new position on November 2, 1998.

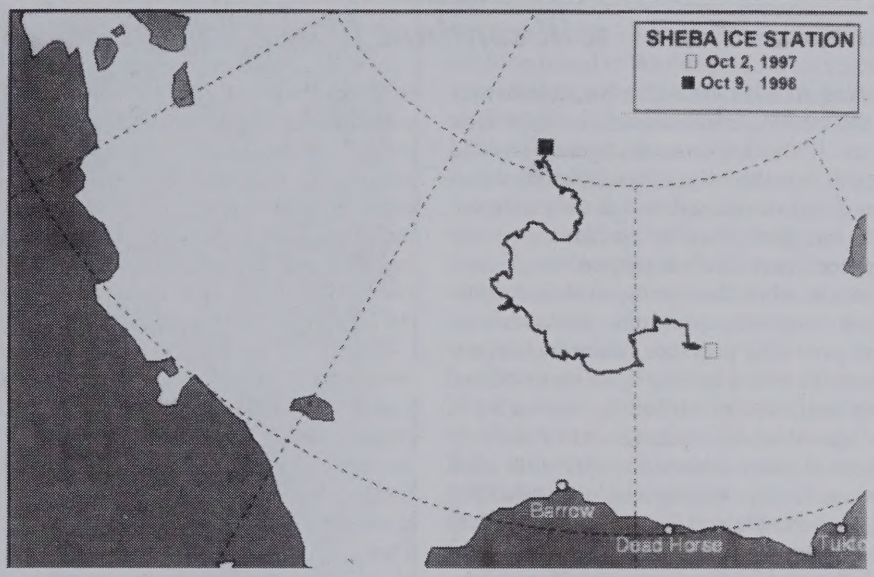
Erb has served as Senior Science Advisor at NSF since 1993. His experience has included representing NSF in the National Science and Technology Council review of the U.S. Antarctic Program, that resulted in the 1996 White House affirmation of the importance of the program to the nation. He also coordinated preparations for the subsequent review by the U.S. Antarctic Program External Panel (known as the Augustine Panel). In addition, he has assisted in developing an agency-wide approach to supporting research in the Arctic. He is also he senior federal science official in the Federal Demonstration Partnership, as designated by the Assistant to the President for Science and Technology.

In 1986, Erb joined NSF as a program manager in the physics division after a sixteen-year career in research and education at Yale University, Oak Ridge National Laboratory and the University of Pittsburgh. From 1989 to1993, under two presidential science advisors, he oversaw the area of basic research in science and engineering at the White House Office of Science and Technology Policy.

Erb is recognized for his research in experimental nuclear physics, particularly in the areas of heavy-ion science and nuclear molecular phenomena.

As head of NSF's polar programs, Erb will oversee an annual budget of approximately $250 million. Acting OPP head John B. Hunt, in that post since August 1997, will devote full time to his responsibilities as Deputy Assistant Director for Integrative Activities in NSF's Education and Human Resources Directorate. ❑ **(cb Billy-Ace Baker)**

Researchers Find Signs of Warming in Arctic Air, Ice and Water



***The New York Times*, 20 October 1998, p. A19, by Malcolm W. Browne**—Having endured arctic storms, dangerous fissures in the ice pack, polar bear intrusions and a year of crushing pressure while frozen into a drifting floe, the Canadian icebreaker *Des Groseilliers* reached Prudhoe Bay, Alaska, over the weekend. Aboard the vessel was a rich cargo of data expected to reveal subtle mechanisms that drive changes in the world's climate.

The ship's arrival on Saturday marked the end of a yearlong round of experiments paid for mostly by the National Science Foundation, with support from the Office of Naval Research and the Japanese Government. The $19.5 million project, called SHEBA, for the Surface Heat Budget of the Arctic Ocean, was a detailed measurement of heat flow among the water, ice and air of the Arctic, and the results are expected to improve the mathematical modeling of global climate change (See Polar Times VoL. 2 No. 11, p3).

SHEBAadministered by the University of Washington, was the largest and most complex project ever supported in the Arctic by the National Science Foundation.

In a telephone call from the ship, Dr. Richard E. Moritz of the University of Washington, director of the project, said the atmospheric, oceanic and geophysical scientists who spent part of the year aboard the floating laboratory would spend several months compacting and analyzing the data collected by thousands of sensors on and around the ship. The investigators will meet in Tucson, Az., at the end of January to begin consolidating their findings, Dr. Moritz said.

Some preliminary results include indications that the entire year was markedly warmer than past years. The ocean was open much farther north than normal, and the ice began breaking up sooner than normal in the spring. Moreover, the salinity of ocean surface water was low, indicating that the water was mixed with an unusually large proportion of fresh water from melting ice.

Dr. Moritz said the warming trend may have been mainly the result of the recent El Niño climate event in the Pacific Ocean, but could also reflect a global warming trend.

Dr. Donald Perovich, SHEBA's chief scientist on loan from the Army's cold Regions Research and Engineering Laboratory in Hanover, N.H., said the research year had been eventful.

"We had a real scare during the winter when our headquarters floe started to break up," he said. "One of our ice camps near the ship broke away and drifted a half mile from the ship in less than an hour."

From the point at which the ship was intentionally embedded in ice 320 miles north of Deadhorse, Alaska, a coastal village 200 miles southeast of Point Barrow, the icebreaker drifted about 1,800 miles before her powerful engines were started and the vessel headed for land (See accompanying Chart).

"Toward the end of the summer," Dr. Perovich said, "the ice had melted so much that thin patches barely covered the water.

"Scientists," he said, "were constantly falling through into the nearly freezing water—11,000 feet deep—so everyone took to wearing flotation devices while working.

"Sometimes we had polar bear visits," he added. "Once, a mama bear was instructing her cub how to floss its teeth with a cable strung out to one of our sensors, and we had to chase them away with a tractor.

"But it was a wonderful project." ❑ ***(Malcom Browne is the former President of the American Polar Society).***

Astronomy on Ice

With new instruments, scientists hope frigid Antarctica will continue to be a hotbed for cosmic research

August 19, 1998—The South Pole may be the best place in the world to study outer space. It's dark six months a year, drier and clearer than the Sahara Desert, and the stars stay fixed in the sky. But there's a downside, too: Temperatures dip 120 degrees below zero, and it's a long way to the nearest hardware store. Despite the harsh and sometimes dangerous conditions, scientists want to expand their presence on the frozen continent. They're planning three sophisticated new instruments—including one buried in the ice—that will scrutinize out-of-the-way places in space other telescopes miss. And they are keenly awaiting conclusion of a $200 million renovation of the cramped South Pole Base, which will expand the number of researchers who can be accommodated in the winter from 28 to 50. This new energy at the South Pole is part of a worldwide construction boom in both ground-and space-based observatories.

At the South Pole, the combination of the region's unique atmospheric conditions and this new class of experimental instruments are already yielding interesting science, according to John Lynch, director of Antarctic astrophysics at the National Science Foundation (NSF) in Washington, D.C. "It's not big observatory stuff. It's clever measurements with small-scale instruments," Lynch said. "Anyone studying the early universe has got to pay attention to their results." Clear as ice!!!!

The first serious astronomers didn't arrive there until the early 1960s to study cosmic rays. These pioneering star watchers, led by Dr. Martin Pomerantz, camped out in temporary Quonset huts during the three-month Antarctic summer and packed up their settlement and instruments each year. The U.S. Navy built the Amundsen-Scott South Pole Station in 1972. It provided improved, if not yet comfortable, living arrangements. The submarine-size crew quarters were so small that two people were unable to stand up at the same time, according to one scientist who lived at the base in the 1970s.

Astronomical research blossomed in 1991 when the NSF established the Center for Astrophysical Research in Antarctica (CARA), a $30 million proving ground for experimental instruments and techniques led by the University of Chicago and nine other institutions. CARA funded the construction and operation of instruments to explore the origin of the universe by observing stages in the evolution of galaxies. These instruments are located about a mile's hike from the rest of the South Pole station in a region called "the dark sector"—a place away from light, heat and noise that could disrupt the supersensitive astronomical detectors. The most impressive results have come from two projects nicknamed COBRA and AST/RO.

The Cosmic Background Radiation Anistropy (COBRA) experiment measures variations in the faint glow of the Big Bang created some 15 billion years ago when the universe was born. Other observatories on Earth can't see this glow because it's obscured by dust and clouds in the atmosphere. That's why the South Pole is such a good place to hunt for this elusive cosmic signal.

The weirdest telescope in Antarctic is actually under the ice; her name is AMANDA.

COBRA's telescopes, the .8-meter Python (which lasted four summers until 1997) and the 2-meter Viper, have detected more than 100 hot and cold spots in the cosmic microwave background. Scientists say these tiny temperature differences, as small as 1/100,000 of a degree, were caused by uneven distribution of matter in the early universe 300,000 years after the Big Bang. Uneven gravity from this lumpy matter eventually led to objects that we see in the present universe, including planets, stars and galaxies. So far, data from Python and Viper surpasses images taken by the Cosmic Background Explorer satellite, which first mapped microwave background in 1992.

Two other telescopes in the CARA program, AST/RO and SPIREX, sit nearby in the dark sector. The 1.7-meter Antarctic Submillimeter Telescope and Remote Observatory (AST/RO) looks at older galaxies, including our own Milky Way, to better understand how stars are formed. AST/RO searches for light in the submillimeter range of the radio spectrum that is usually blocked by water vapor. The light comes from carbon atoms in the cool glowing gas that is the breeding ground of stars.

The South Pole Infrared Experiment (SPIREX) is pointed toward nearby galaxies as well, but it is looking at light in the infrared and near-infrared wavelengths, searching for "cold" stars like brown dwarfs that emit very little radiation. In 1994, SPIREX recorded spectacular images of Comet Shoemaker-Levy's collision with Jupiter.

Perhaps the weirdest telescope in Antarctica is actually under the ice. Known as AMANDA, or the Antarctic Muon and Neutrino Detector Array, the instrument is used to hunt for tiny particles called neutrinos. Neutrinos are spewed out by high-energy stars but can't be captured by normal instruments. They are so small that they pass through everything, including mirrors.

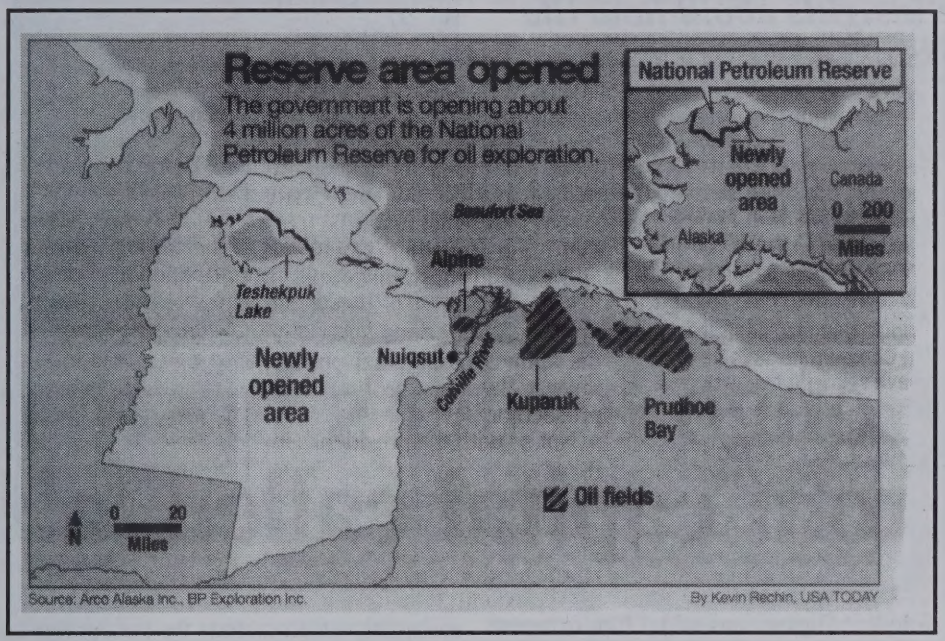
Bob Morse, a University of Wisconsin physicist, has put a neutrino detector under the Antarctic ice. The group's detector consists of 14 shafts drilled into the two-mile thick Antarctic ice sheet. A string of glass balls containing special light detectors are then lowered into the holes, which are filled with water and refrozen. The detectors are designed to pick up flashes of light that indicate the possible presence of a neutrino colliding with molecules of ice. Since it began operating four years ago, AMANDA has picked up several flashes that may indicate the presence of neutrinos.

Scientists who gathered last month in San Diego at the American Astronomical Association are now planning the next generation of instruments on the South Pole. They also want the support of the international scientific community for a major observatory. Plans are under way for a new $10 million, 2-meter submillimeter telescope, a larger infrared device, and a $70 million neutrino detector called ICECUBE that will lower hundreds of detectors into a cubic kilometer of ice.

Roopesh Ojha, a 30-year old Indian-born astronomer from Boston, is the scientist scheduled winter-over. He has passed psychological tests, lost his wisdom teeth (no on-site dentist) and is prepared to live nearly a year with 28 scientists and workers. He sees the bright side of Antarctic astronomy."I'll have a wonderful state-of-the-art observatory to play with," he said. "Besides, there's nowhere to spend money. You take a lot of books and posters of tropical scenes." ❑ ***(cb Billy-Ace Baker)***

Ed. Note—See related article, *Polar Times*, Vol. 2 No. 11, p16

In Compromise, U.S. Opens Part of Alaska North Slope to Drilling



***The New York Times*, 7 August 1998, p. A18, by John H. Cushman Jr., WASHINGTON, Aug. 6**—The Interior Department said today that it would open a new expanse of the Alaska North Slope wilderness to oil and gas leasing, but it limited drilling in some areas that the industry is most eager to explore.

To protect lakes where migrating geese molt and the main calving area of the local caribou herd, the Interior Department refused to allow development in an area north and east of Teshekpuk Lake near the Beaufort Sea, a coastal plain as rich in wildlife as it probably is in oil.

"Critics said it was unwise to begin producing oil from a strategic reserve when oil is so plentiful and cheap."

Interior Secretary Bruce Babbitt, in a decision that was widely anticipated, said companies would be allowed to look for oil on four million acres of the National Petroleum Reserve, west of the Prudhoe Bay, oil fields where wells already feed the Trans-Alaska Pipeline.

The petroleum reserve is a 23-million-acre tract between the Brooks Range and the Arctic ocean, set aside since 1923 as a strategic reserve. The northeastern fifth of the reserve is thought to hold about half a billion barrels of oil, about a month's supply for the United States.

Congress approved leasing of oil and gas in the reserve in 1981, but the oil industry became more interested in recent years as oil and gas development approached the boundaries from the east. Alaska's Governor, Tony Knowles, a Democrat, asked President Clinton to allow leasing, and the Interior Department has been studying the question for 18 months. Conservation groups have opposed leasing there because the land provides habitat for fish, birds and caribou. But unlike the Arctic National Wildlife Refuge to the east, the land is not set aside for wildlife.

The plan establishes various restrictions on development in different parts of the tract, depending mainly on the use by wildlife.

Nearly all of the goose-molting area was kept off limits. But in some sections, only activity on the surface is barred, so oil companies could drill into these lands from the side. In other areas, conditions are imposed to minimize disruption of the caribou herds, to protect the riverside nesting sites of peregrine falcons and other raptors and to keep permanent oil and gas equipment away from the shores of lakes that are deep enough to hold fish.

The Interior Department refused to allow development on 600,000 acres of the 4.6-million-acre tract that it studies for possible leasing. Much of the land that it put off limits is around Teshekpuk Lake and the coastal plain where the oil industry believes the richest deposits lie.

"This is a terribly shortsighted decision," said William H. Meadows, president of the Wilderness Society, an environmental organization based in Washington. "This reserve contains some world-class wildlife habitat, vital to grizzly bears, caribou, and millions of shorebirds, ducks, and geese."

Mr. Babbitt visited the area for several days last year and ordered extensive scientific consultations before making his decision. He said his plan had addressed the major environmental concerns and the needs of residents who subsist on caribou, fish and marine mammals.

Critics of the plan said it was unwise to begin producing oil from a strategic reserve at a time when oil is plentiful and cheap. Mr. Babbitt said that oil leasing would not begin until next year, followed by exploration, and that production would be unlikely to begin for 10 years.

Kevin Meyers, president of Arco Alaska, a unit of the Atlantic Richfield Company, said he was pleased the Interior Department was recommending a lease sale but regretted that more of the coastal area was not to be opened. ❑ **(cb Peter Barretta)**

Ohio State Team Finds Fossil in Deep Freeze

***Columbus Dispatch*, 19 July 1998**—Ordering crawdads on ice has a new meaning now that geologists have found the oldest fossil crawfish ever—in Antarctica.

The discovery of the 280-million-year-old crustacean suggests that the climate near the South Pole was relatively balmy at the time—at least in the streams and lakes where crawdads live. Only later did the continent freeze out the crawfish.

A team led by Loren Babcock of Ohio State University reported on the find last month in the journal *Geology*.

The scientists found just a fragment of the ancient crawfish in the Transantarctic Mountains in the central part of the continent. The fossil was a part of a claw that had been gnawed on by a predator. ❑ **(cb Peter Anderson)**

Antarctic Ice Supports Life Six Feet Under

This finding may provide insights about how life could exist in other parts of the solar system

PHOTO: ANTARCTIC JOURNAL XXXI No 2.

***The Oregonian*, 13 July 1998, p. B1, by Richard L. Hill**—Primitive life forms are flourishing within one of Earth's most frigid, arid environments.

Scientists from Oregon State University, Montana State University and three other institutions report today in the journal *Science* that bacterial colonies are thriving in pockets of liquid water and sediment buried in more than six feet of Antarctic lake ice.

Their finding may provide insights about how life could exist in other parts of the solar system because the Antarctic habitat may be similar to that found on Mars and Jupiter's moon Europa.

The clumps of bacteria are found in lake ice in the McMurdo Dry Valleys, considered the planet's coldest and driest deserts. Surrounding mountains shield the area, which only receives about 4 inches of precipitation each year. The average temperature is about 68 degrees below zero Fahrenheit.

"This is a very barren environment with virtually nothing we usually associate with living organisms," said Stephen J. Giovannoni, an association professor of microbiology at OSU. "They have their own little world there we knew nothing about."

A little solar radiation, sediments and water are all it takes to awaken the "freeze-dried" organisms—a process called cryptobiosis—during summer months. "If you're frozen, you're really not going to do anything," Giovannoni said. "But if you're in the ice and enough radiation hits the ice to make little pockets of melted water, that's where these guys are growing. It's a great place for them to be."

The tiny bugs are cyanobacteria, a blue-green algae, one of the simplest known microorganisms. Cyanobacteria were around 2 billion years ago and were responsible for creating the oxygen in the Earth's atmosphere, Giovannoni said.

Cyanobacteria require little in the way of nutrients because they receive phosphorous and iron from the ice sediment particles. The bacteria release oxygen as they make carbohydrates from water, and they also convert nitrogen into a usable form. As the organisms grow, they reach out to microbes on other clumps and glue themselves together,.

The scientists collected ice samples from six of the permanently ice-covered lakes in the McMurdo Dry Valleys, primarily Lake Bonney (see Figure 1).

"The habitat in the Antarctic lake ice may serve as a model for life on Mars and Europa," they concluded. Although Mars may have had extensive liquid water at one time, it rapidly cooled; and ice would have become the dominant form of water on the surface."

On Europa, surface ice appears to exist in contact with subsurface liquid water, so solar heating of the subsurface could result in melt layers similar to those in Antarctica, the scientists wrote.

"If you are a bacterium, ice is a great place to hide," Giovannoni said. "You're never really dry; you're protected by radiation, but you can still get light, which is the basis of the food chain on most parts of Earth. If I were a bacterium on Mars, ice is one place I'd like to be."

Giovannoni's lab is well known for developing genetic methods for understanding microbial diversity in natural systems. He has studied bacteria from several environments, which include the hot springs in Yellowstone National Park and Crater Lake.

"Recent advances in molecular biology now allow us to identify these unknown organisms," Giovannoni said, "and what we're learning is the world is full of bacteria we know virtually nothing about. I could probably isolate a new, previously unknown bacterium from the sole of your shoe." ❑ **(Multiple contributors)**

Researching Frosty Part of the Food Chain

***USA Today*, "Science," p. 5D, 16 June 1998**—The ice is an important part of the Antarctic's food chain, and biologists are aboard the *Nathanial B. Palmer* studying it.

Their main interest: how the sea ice ecosystem functions in early to midwinter.

Until the German research vessel *Polarstern* made its 1986 cruise through the Antarctic ice during the winter, scientsts had assumed that krill, the small shrimplike creatures that penguins, seals, sea birds and whales eat, hibernated on the ocean floor during the winter. That's not the case.

"The algae in sea ice can be abundant and diverse, and there are abundant and diverse assemblages of micro zooplankton that feed on the algae," says Marcia M. Gowing of the University of California at Santa cruz.

These in turn feed the krill, which feed the animals at the top of the short food chain—seals and penguins and whales.

Gowing's group is collecting ice cores, brine, water and plankton samples to study upon their return to Santa Cruz. She and others will use electron microscopes to study viruses in organisms in recently formed ice and in organisms that may have bloomed in the autumn.

"Recently there has been a focus on determining where viruses fit into the carbon cycle of the oceans and if viruses are important in terminating blooms of algae," Gowing says.

Algae that grows on Antarctic ice, and the viruses that infect the algae, are part of the big picture of carbon's cycle through the air, the oceans and living creatures.

Carbon that human activities are adding to the air is suspected of causing the Earth's climate to warm. Algae take up carbon from the ocean, and probably the air, as they grow.

If fewer algae bloom, less carbon would be taken from the sea and the air, leaving more to affect global climate. ❑

Flying High Down Under

Air National Guard members ship out to take over Antarctic project

***Times Union*, "Life & Leisure" section, 24 February 1998, p. D1, by Paul Grondahl**—New York Air National Guard Senior Master Sgt. Art Bleich has a logistics problem.

He needs to sell a house and relocate his wife and three children from upstate New York through a half-dozen time zones and across more than 10,000 miles to New Zealand.

"My family is really excited about this opportunity to travel and to grow," Bleich said in a phone interview from Christchurch, New Zealand. He just hasn't figured out all he specifics of moving his family and their belongings this spring from Maryland to Christchurch, New Zealand for a four-year tour of duty.

Bleich is the aircraft maintenance superintendent for a new permanent detachment—Operation Deep Freeze—of the Guard's 109th Airlift Wing that supports National Science Foundation polar research in Antarctica.

Bleich, who had worked at the Stratton Air National Guard Base in Scotia, N.Y., is part of a seven-person, year-round operation with four aircraft in Christchurch established last fall.

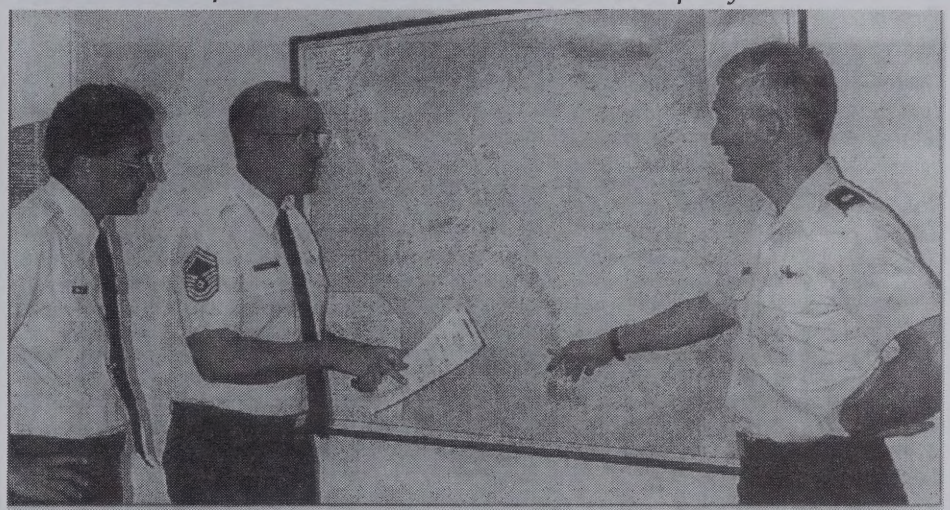
The Guard members plan to rotate through the New Zealand post every four years. The 109th is taking over as sole operator of the Antarctica mission as the U.S. Navy phases out its presence by 1999.

At that time, the 109th detachment will be the only military unit in the world that flies and maintains ski-equipped LC-130 cargo planes. The "ski birds," as they are known, are capable of landings and takeoffs with heavy loads in extreme polar conditions.

"This is a world-class assignment, and it was the right time in my life to do something extraordinary," said Lt. Col. Richard Saburro, acting commander of the new 109th detachment in New Zealand. "This is work that I've always found intriguing, challenging and satisfying."

Saburro, 51, relocated to Christchurch from Schenectady, N.Y. A part-time LC-130 pilot who has flown repeatedly to the Arctic and Antarctic, he left a position as a business development director for the New York State Center for Advanced Film Technology at the University at Albany.

"It took a lot of consideration for myself and the rest of our unit who made this move," Saburro said. "But it was an unprecedented career opportunity."



LT. COL. RICHARD SABURRO, far right, points out destinations on a map of Antarctica as Senior Master Sgt. Art Bleich, center, and Master Sgt. Paul McMillan, far left, look on at the International Antarctic Center in Christchurch, New Zealand.

Master Sgt. Paul McMillan is relocating to Christchurch, too. McMillan, 36, of Ballston Spa, and single, quit a full-time position in auto claims at State Farm Insurance in Malta for the New Zealand opportunity.

McMillan is supply superintendent for Operation Deep Freeze. He stocks a warehouse with aircraft parts. The ski birds receive an unusual amount of wear and tear in the extreme weather of Antarctica: 100-mile-per-hour winds, temperatures plummeting to minus 100°, and bumpy, snow landing strips.

Right Place, Right Time

Staff Sgt. Carol Gehm didn't require any adjustment. She moved to Christchurch with her husband, a Department of Defense employee, and their three children two years ago from Italy. Gehm was working in the local post office when she struck up a conversation with a 109th crewmember. She got an interview and was hired as an office manager.

"It was great getting back into the blue," Gehm said. With the 109th, she wears a blue uniform similar to the one she wore in the Air Force Reserves.

"I was in the right place at the right time. I'm looking forward to the challenge," Gehm said. "The post office job was pretty much a no-brainer."

Gehm said her kids like living in New Zealand, particularly driving four-wheel-drive vehicles in the Outback, swimming in the ocean and sunbathing in February.

"It's never been boring," said Gehm, whose family has lived in several foreign locales. "We plan on seeing as much of the world as we can." ❑ **(cb Peter Anderson).**

Global Warming Victims

The Fairfax (VA) Journal*, 23 October 1998, p. A2**—Warmer temperatures and more snow are to blame for the steep decline in the caribou population of the Canadian Arctic, the environmental group Greenpeace reported. During the past 30 years, the total caribou population of Canada's western Arctic islands has dropped from 24,000 to only 3,000. Ann Gunn, of the Bathurst Island Research Station in Canada, told reporters that "caribou are expending valuable energy trying to dig through deeper levels of snow to eat, and eventually run out of energy and starve to death." Scientists believe more arctic snowfall will occur as a result of the global warming. ❑ ***(cb Peter Barretta)

Alaska Scientists Probe Environment

The Associated Press, by Rosanne Pagano, ANCHORAGE, Alaska—Harry Brower recalls the days when he'd help his mother render seal blubber into edible oil, stirring the liquid until fat dropped to the bottom of the bucket.

These days, the 40-year-old Inupiat Eskimo hunter says, rendered seal blubber doesn't sink. "It used to in the past and I'm not sure what the cause of that is," said Brower, a fish and game researcher in Barrow, the nation's most northern community on the Arctic Ocean.

That change and other unexplained oddities such as hairless seals and lesions on fish have left researchers curious and a bit worried. Could whale meat, berries and seals—the foods traditionally eaten by native Alaskans—be contaminated?

To answer that question, Western researchers might have descended on Alaska to conduct their high-tech tests on the environment and the population in a virtual vacuum.

But in a unique program announced Tuesday, researchers will combine knowledge gathered by native Alaskan communities with Western science as they delve into the long-term effects of the state's pollution.

Dr Richard Chappell presents Honorary Member Certificate to Charles Passel as his wife Alda looks on. See story page 3.

...villagers have testified about unexplained oddities such as hairless seals...

Armed with a three-year, $700,000 grant from the Environmental Protection Agency, the Alaska Native Science Commission will stress traditional knowledge. Native Alaskans will be equal partners in the research.

The project—which relies on traditional "talking circles" to gather information from native hunters, fishermen and cooks will unite villagers' observations with Western science in a first-of-its-kind examination of subsistence foods statewide.

"The commission wants to hear what people have noticed," said Mary Killorin, a research associate director with the Institute for Social Economic Research at the University of Alaska in Anchorage. Sessions will be patterned after a traditional talking circle, the native version of a New England town meeting.

The hunting and gathering ways of native Alaskans—Tlingits, Haida and Tsimshian in the southeast, Inupiat and Yupik along the north and west coasts, Aleuts of the Aleutian Islands and Athabascan through the interior—will be asked their views.

Killorin said villagers have testified at "zillions" of hearings over the years about unexplained oddities such as hairless seals, darkened burbot fish livers and off-tasting Labrador tea leaves, used to treat everything from arthritis to upset stomach.

David Norton, a staff scientist with the Barrow Arctic Science Consortium, said Alaska's traditional foods generally are pure despite airborne and land- based pollutants that may creep northward from industrialized regions.

However, contaminants have been detected in parts of Russia and extreme northeast regions of Greenland, Norton said.

"We're very concerned that southern sources of pollution may be accumulating in the Arctic," he said. "We want to start studying now."

Combining Western and native approaches in scientific studies requires patience, but it pays off, and not only in knowledge gained, Norton said. "What comes out of it is a lot of mutual respect." **(cb Billy-Ace Baker)**

Book Details Spy Role of Submarines in Arctic

Associated Press, 10 November 1998, by John Diamond, WASHINGTON—Years after a Navy turncoat informed the Soviets of an undersea eavesdropping operation in the Pacific, U.S. intelligence continued to collect information from another Soviet communications cable under the Barents Sea in the Arctic , according to a new book on submarine spy wars.

In a tale that has the Navy refusing to comment and retired submariners rejoicing that their story is finally being told, "Blind Man's Bluff" uncovers new detail about how U.S. submarine forces were used for much more than chasing Soviet subs under the Arctic ice.

Through unofficial sources such as retired submarine crews, authors Sherry Sontag and Christopher Drew pieced together the 1979 voyage of the *USS Parche*, a nuclear-powered attack submarine sent on a mission of espionage.

With the personal approval of President Carter, the *Parche* moved under the polar ice cap into the Barents Sea. Locked in the vessel's torpedo room were a crew of communications experts, the "spooks," as the crew referred to them. They used a deployable remote camera to find a military communications cable linking the Soviet port of Murmansk to the major northern bases of the Soviet fleet.

Settling the submarine quietly to the bottom, and operating well within Soviet territorial waters, the crew attached to the cable a listening pod specially designed by Bell Laboratories.

Another Navy submarine lurked nearby to throw up a diversion should the Soviets attempt to seize the spy sub, say the authors. If all else failed, the "captain was under orders to blow up his own ship," taking his crew, the spooks and the espionage equipment with him.

The tap opened to U.S. scrutiny Soviet navy planning for nuclear warfare, showing, among other things, that Soviet naval forces were not designed to launch a first strike. CIA and NSA officials came to refer to the intelligence flowing from the Barents cable as "the big casino" or "the crown jewels."

In 1982, the Soviets pulled up the Okhotsk tap pod—helpfully marked, "Property of the United States Government." A senior Naval Intelligence official suspected a turncoat, a hunch confirmed in 1985 with the arrest of Ronald Pelton a former NSA cryptologist.

Only then did the level of risk involved in returning to the underwater tap sites become clear. Nevertheless, the Barents Sea cable continued to provide intelligence through the end of the Cold War. "This book does not represent the views of the United States Navy, and any accounts have been derived strictly through unofficial sources," according to a Navy statement.

In a jacket note written for the book, retired Navy LCDR Roy Boehm, creator of the Navy Seal teams, says the account "is a long overdue, well deserved tribute to those unsung heroes of the Navy's 'silent service.' " ❑ ***(cb Billy-Ace Baker)***

The Jeremy Project

NASA scientists led a hunt for a ship wrecked whaling fleet lost more than a century ago in the icy seas of Alaska by using the same techniques that flashed computer signals across 170 million miles of space to steer the *Sojourner* rover's historic mission on Mars a year ago. In early August the remains of a whaling fleet of 32 ships that were crushed by the sea ice 127 years ago were located off Icy Cape, Alaska

The dramatic space agency's quest involved the Coast Guard's powerful icebreaker *Polar Star*; a tiny underwater robot vehicle called *Phantom XL* made in San Leandro, California; a team of computer scientists called the Intelligent Mechanisms Group at NASA's Ames Research Center in Mountain View, California, a historian from the State of Alaska; and a Santa Clara university student eager to share the adventure with the rest of the world via the Internet.

The hulks of the 32 ships in the whaling fleet out of New Bedford, Mass., have been strewn across the bottom of the Chukchi Sea since 1871, when a violent storm trapped them in ice off a desolate promontory aptly named Icy Cape, southwest of Barrow. Miraculously not a single life was lost, for seven other vessels escaped the ice and rescued the trapped crews.

Jeremy Bates, 21, an underwater archaeology senior at Santa Clara, encountered Jeff Ota, a research engineer at Ames who was seeking a venture to test the technology of robotic vehicles for undersea research—a key element of NASA's new focus on what the agency calls "astrobiology."

The results of that meeting was the "Jeremy Project," with Ota as the project leader and Bates focusing on the effort to locate the whaling fleet itself.

The expedition began in July when the Coast Guard's *Polar Star* sailed for Alaska. In early August, Ota, Bates and their colleagues carried the underwater robot *Phantom XL* to the ship by helicopter from the airport at Point Barrow.

The *Phantom XL*, manufactured by Deep Ocean Engineering Inc., of San Leandro, is only 43 inches long, weighs 100 pounds, and can cruise along the ocean bottom at 2 knots. It carries stereoscopic video cameras developed by NASA, and its course was controlled using the same computer software that navigated the *Sojourner* robot on Mars during the space agency's spectacularly successful *Pathfinder* mission in July 1997.

Unlike the mission controllers of the Mars venture, whose signals were transmitted through space by radio, the *Phantom XL*'s computer crew sent their signals through water to the robot via 550 feet of communication cable.

According to Ota, the Phantom's cameras relayed detailed stereo images of the ocean bottom in the area where the whaling fleet sank years ago to create a "virtual reality" map of the undersea environment, somewhere between 27 and 52 feet beneath the surface.

After several anxious hours while the *Phantom XL* roamed the bottom the video image of a ship came into view. The ships dive team was sent down eighty feet to the site of the wreckage . After 35 minutes they emerged with some antique coal and blackened bricks, probably from a whalers tryworks. These artifacts will be used by Alaska State Historian Michele Hope to claim the wreckage and legally preserve and protect it.

A week later the *Polar Star* had to depart on another mission, but the entire group will assemble next year to continue the work.

The entire expedition, including images acquired by the underwater robot, has been posted on the Internet at the project's Web site: quest.arc.nasa.gov/arctic. ❑ **(cb Joe Rychetnik and LtJG Andre Billeaudeaux, USCG).**

NASA GOES TO SEA
Using NASA's "virtual reality" software that steered the roving Sojourner vehicle on Mars last year, space scientists will explore a historic shipwreck off Alaska this summer.
Phantom XL
The underwater robot Phantom XL will be navigated by remote computer control from aboard the Coast Guard icebreaker Polar Star. The Phantom weighs only 100 pounds, carries twin stereoscopic video cameras, and cruises on the sea bottom at 2 knots.
PHANTOM
Hemmed in by ice during a vicious Arctic storm, these 32 ships of a whaling fleet out of New Bedford, Mass., were abandoned by their crews and sank off Icy Cape, Alaska in 1871.
Detail area
ALASKA
Anchorage
Exploration Site
Barrow
0 300 MILES
Wainwright
Icy Cape
Chukchi Sea
INTERNATIONAL DATE LINE
Point Hope
ALASKA
KOTZEBUE SOUND
ARCTIC CIRCLE
Bering Strait
SEWARD PENINSULA
0 100 MILES
Sources: Deep Ocean Engineering, Inc., Drawing courtesy of the Whaling Museum, New Bedford, Mass.
Chronicle Graphic

Climate Research Center Opens in Fairbanks

Alaska*, November 1998, p. 15**—Climatologists say El Niño is out and La Niña is in, which could spell a fierce winter throughout Alaska. Forecasters are predicting increased storms, armpit-deep snow and enough cold to freeze a sled dog's tail. Meanwhile, in Fairbanks, where 60 degrees below zero is not unusual, the folks who study weather phenomena are preparing to get all warm and cozy in a new $30 million International Arctic Research Center on the University of Alaska campus. The Japanese government has paid 60 percent of the four-story building's costs—and Japanese scientists will be in residence to study global climate chagne. The center will open officially in early 1999. ❑ ***(cb Peter Barretta)

Winter Camps Thrive

43 stations and 18 nations on ice

***The Antarctic Sun*, 7 February 1998, p. 1, by Brenda Joyce**—Forty-three stations from eighteen nations will winter over this season but less than 1,200 people will be "On the Ice" after February ends.

McMurdo's metropolis of 170 residents will outnumber the combined population of all six Argentinian winter stations. Typically, less than 20 people per base will keep the lights on around the continent.

Peninsula stations are closely grouped. For instance, nine different nations cluster on King George Island and often collaborate on projects.

Peru, Brazil, Chile and Argentina, aided by research vessels, center much of their work on the abundant marine life near South America.

South Korea, China, India and Japan established bases during the '80s and '90s. Japan's own "heroic age" pioneer, Nobu Shirase, explored the Bay of Whales in King Edward VII Land in 1911—the same year Amundsen reached the Pole.

With only 70 people in the summer and 20 in the winter, Poland's Arctowski Station is perhaps the most international base. Cooperative studies are carried out with 11 nations including Bulgaria, Peru, Spain and Belgium.

European bases circle the entire continent and fan out to the sub-Antarctic islands claimed in the days of early exploration. Australia's modern communications keep their three continental stations in touch with each other, and their web pages keep the world in touch with them.

Only 12 Kiwis, neighbors to McMurdo Station, will remain at New Zealand's Scott Base while France's Dumont d'Urville will have less than 20 winter-overs. Italy's Terra Nova Bay will close on February 28.

SANAE 4, the current South African Station, was completed in 1996-97 after SANAE3, built in 1980, was crushed under 25 meters of snow. A part of 20 completed it last season near the Fimbul Ice Shelf.

Some stations have it easier than others. Two extremes are the British Halley and Rothera Research Stations. Rothera's supplies can be easily discharged from a wharf at the southern tip of Adelaide island, while Halley is built on the floating Brunt Ice Shelf in the Weddell Sea. Supplies are landed by ship on the ice edge and then towed by SnoCats on sledges to the base, some 12km away. Easily the most isolated of the UK stations, Halley can only be visited twice a year by ship.

No base, however, endures more than Vostok. It has experienced the coldest recorded temperature on earth (128.6°F) and is located at the geomagnetic South Pole at the center of the East Antarctic ice sheet. The Russian scientists also suffer from financial problems inherited by their country from the former Soviet Union.

IN 1996 the R*R/V Nathaniel B. Palmer* broke through June's pack ice to bring tons of food and supplies to 38 Russians marooned at Vostok when their supply ship was turned around for mechanical and financial problems. The scientists were stranded and surface vehicles had to haul food from Mirny, their resupply point, 500 miles away.

While the days of map-making explorations are over, it is unlikely that the heroic age will ever really end on the seventh continent. o **(cb Billy-Ace Baker)**

Tourists vs. Penguins: Study Has Surprising Results

***Antarctic Journal-Review* 1996, p. 275**—Tourism in Antarctic has increased significantly over the last 20 years, and predictions suggest this trend will continue. The possibility that tourism may negatively affect wildlife populations has thus become an issue of increasing concern to both private and government organizations, and penguins have likewise become the focus of current efforts to understand interactions between humans and wildlife. Long-term research undertaken at Palmer Station on Adélie penguins (*pygoscelis adeliae*) was recently expanded to include a human-impacts component. Palmer Station is an ideal site for these studies because it is both a favored stop for tourists and the location of two programs that not only have a broad ecosystem perspective focused on the biology of Adélie penguins but also provide background ecological data.

The study was based on Torgersen Island, which lies approximately 1 kilometer northwest of Palmer Station (Figure 1). For several seasons, Torgersen Island has been divided into two areas, one open to tourism and the other closed; the latter serves as a control for conducting research in the former. Palmer Station receives approximately 12 ships per season (fewer than 1,300 tourists). Typical visits to Torgersen Island last about four hours, and a new group of 10-50 tourists arrives on the island every hour.

Seasonal comparisons of the relationship between the number of tourist visits and Adélie penguins' breeding success showed surprising results. The three-season mean reproductive success for visited areas of 1.53±0.35 chicks creched per pair is significantly higher than that for the control sites, where only 1.38±0.36 chicks were creched per pair.

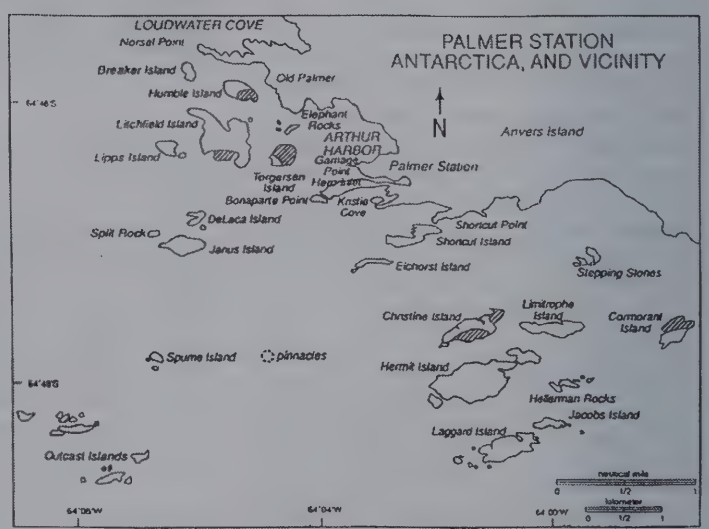


Figure 1. Palmer Station, Antarctica, and vicinity. Adélie penguin colonies on surrounding islands are indicated by shading.

> *"It appears that tourism...does not affect Adelie penguin reproductive success"*

Based on the preliminary evidence resulting from this study, it appears that tourism as it is currently regulated at Palmer Station does not affect Adélie penguin reproductive success.

The results support the hypothesis that environmental factors associated with variability in the breeding habitat (i.e., snow disposition, colony aspect, predation) may be more influential in determining the fate of nesting Adélie penguins than tourism. ❑ ***(Excerpted from a report by Donna L. Patterson, Eric J. Holm, Karen M. Carney and William R. Fraser).***

Map from Antarctic Journal XXXI Vol 2

Auroras Keep Scientists On Their Toes

***The Columbus Dispatch*, "Insight-Discovery," 12 July 1998, p. 7B, by Alexandra Witze**—The otherworldly glow of the northern lights fascinates scientists as much as tourists.

In Alaska, for example, the aurora borealis appears almost every clear night, in varying colors and shapes, from broad green draperies to reddish arcs.

Visitors, not surprisingly, frequently ask what causes such a magnificent celestial sight. Unfortunately, scientists don't have much of a clue beyond the basics.

"The more you learn about the aurora, the less you seem to know," said Joseph Borovsky, a researcher at Los Alamos National Laboratory in New Mexico. "People in the 1960s and '70s had a very simple picture of how the aurora worked. When they got satellites flying through, things got very complicated."

These days, researchers have a host of techniques by which to plumb auroras, from flying planes beneath the lights to peering down from above.

With such methods, physicists are finding what they didn't expect—such as the fact that auroras don't get more frequent when the sun becomes more active and that auroras tend to follow coastlines.

Today scientists know that an aurora results from the steady stream of charged particles that flow from the sun.

The flow, known as the solar wind, collides with the magnetic field surrounding Earth. Some of the electrons within the wind get channeled along the strong field lines, which curve into the poles. As the electrons approach the polar regions, they slam into atoms and molecules in the upper atmosphere and release their energy.

The sun goes through an 11-year-cycle of activity; at its peak, called solar maximum, the sun becomes mottled with more sunspots and emits a stronger solar wind.

Yet Johns Hopkins University researchers from the Applied Physics Laboratory in Laurel, Md., have found that fewer auroras occur during solar maximum.

Their study, reported last month in the journal *Nature*, confirms an earlier theory on the way ultraviolet rays affect how the atmosphere conducts electricity

"In retrospect, it seems like it should have made sense all along," team leader Patrick Newell said.

The earlier theory: More ultraviolet rays increase conductivity, decreasing the number of auroras in sunlight.

In 1820, Russian explorer Ferdinand von Wrangel wrote in his journal how the northern lights along the edge of Siberia seemed to wander along the shore.

University of Iowa physicists, seeking to test the folklore, have pored over some 8,600 pictures taken by a satellite.

Electric currents, suggest Louis Frank and his colleagues, move much more strongly within seawater than within land, affecting the structure of the aurora high in the atmosphere.

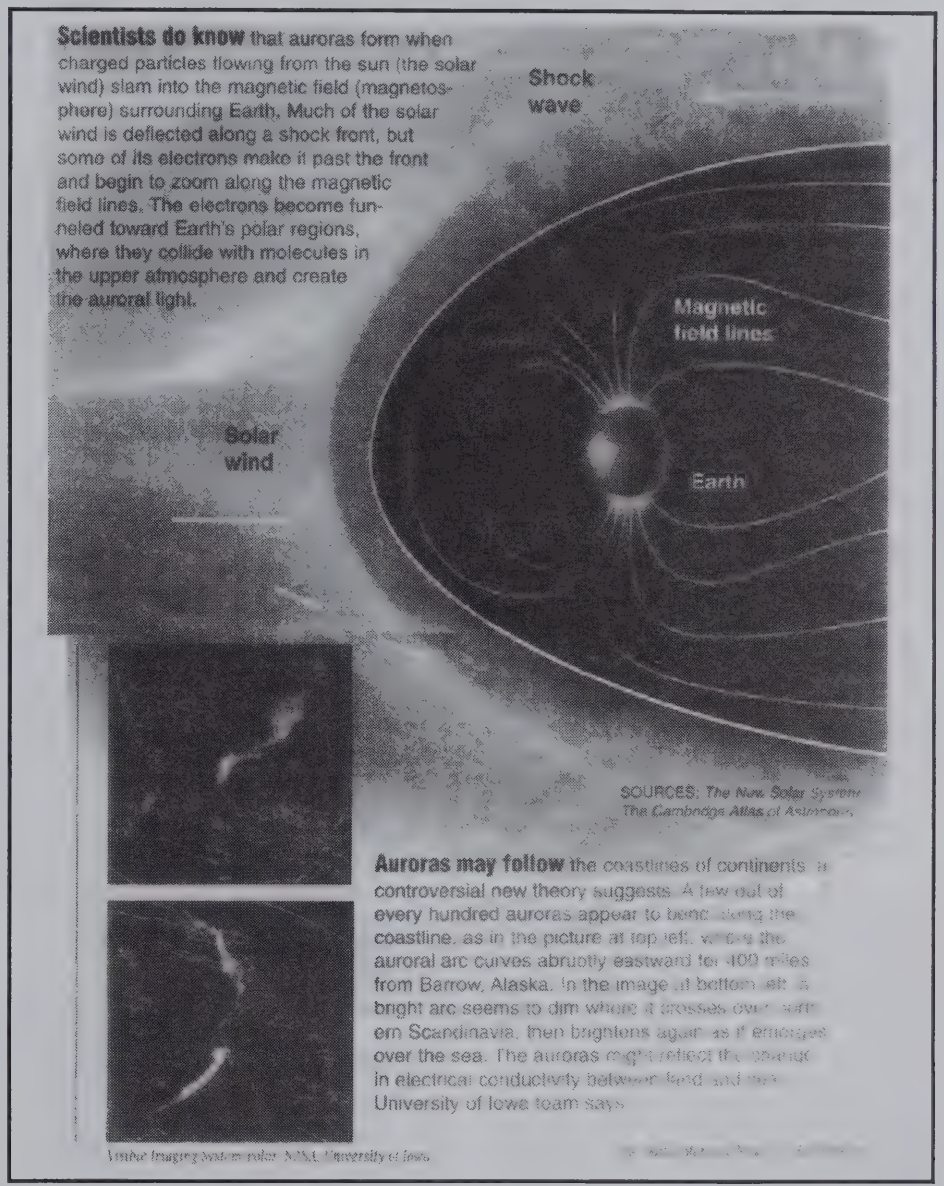
"For the ground to somehow affect the aurora at very special times, that's extremely interesting," Frank said last month in Boston at a meeting of the American Geophysical Union.

On the other hand, a team led by Tuija Pulkkinen, a researcher with the Finnish Meteorological Institute in Helsinki, has found rare instances of bending lights along coasts.

His is a secondary effect that can't really control the existence or formation of auroras," she said in Boston, "but can control where and how they appear."

During the next couple of years, until the next solar maximum around 2000, scientists plan to keep using results from satellites—and experiments flown on rockets and jets—to learn more.

"I think we've made most of the surprising discoveries as far as the new data," said investigator Charles Carlson of the University of California, Berkley. "Now its another big step to understanding how it all fits together." ❑ **(cb Peter Anderson).**


Scientists do know that auroras form when charged particles flowing from the sun (the solar wind) slam into the magnetic field (magnetosphere) surrounding Earth. Much of the solar wind is deflected along a shock front, but some of its electrons make it past the front and begin to zoom along the magnetic field lines. The electrons become funneled toward Earth's polar regions, where they collide with molecules in the upper atmosphere and create the auroral light.
Shock wave
Magnetic field lines
Solar wind
Earth
SOURCES: The New Solar System
The Cambridge Atlas of Astronomy
Auroras may follow the coastlines of continents a controversial new theory suggests. A few out of every hundred auroras appear to bend along the coastline, as in the picture at top left, where the auroral arc curves abruptly eastward for 400 miles from Barrow, Alaska. In the image at bottom left, a bright arc seems to dim where it crosses over northern Scandinavia, then brightens again as if emerged over the sea. The auroras might reflect the contrast in electrical conductivity between land and sea. University of Iowa team says

Plan to Exploit Lake Vostok—NASA's Stepping Stone to Europa

Antarctic **(New Zealand Antarctic Society), Vol. 16, No. 2, 1998, p. 35**—Controversy surrounds the plan to penetrate the pristine waters of Lake Vostok in order to prepare for a mission to Europa, one of Jupiter's moons.The idea was presented at the annual meeting of the Polar Research Board on 1 May 1998 by Dr. Frank Carsi of NASA's Jet Propulsion Laboratory (JPL).

Earlier, at the Antarctic Treaty Consultative Meeting (ACTM), Russia stated that it intended to produce a draft Comprehensive Environmental Evaluation (CEE) for the proposed drilling into the subglacial lake under Vostok station and circulate this for comment. However the CEE had not been completed at the time of the Polar Research Board meeting.

According to a report in the *Antarctic Project*, if a CEE concluded that the technology was not available to ensure the sterility of the lake, the project might not be approved.

Dr. Carsi had avoided assurance as to whether or not the NASA drilling project would be abandoned.

The proposal to drill into Lake Vostok below the very thick East Antarctic ice cap has raised serious concerns, namely the need to preserve a pristine part of Antarctica and to ensure that all appropriate procedures are followed in accordance with international law, including the Environmental Protocol.

Europa is one of the four largest moons and first seen by Galileo satellite. It is the smoothest object in the solar system, with a surface of frozen water. NASA officials think the Jovian tides have thawed an ocean of liquid water underneath the ice. Speculating that life may exist in this theoretical extraterrestrial ocean. NASA plans to send a robot to Europa, having trialed it in Lake Vostok. ❑ ***(cb Peter Barretta)***

Antarctic Course Planned

***The Press*, 28 October 1998, CHRISTCHURCH, New Zealand**—A new graduate certificate in Antarctic Studies course, which includes a 10-day field trip to Antarctica, will be launched at the University of Canterbury on January 11 next year.

Run jointly at Canterbury University and Antarctica New Zealand sites, the certificate has brought together resources from numerous tertiary institutions and academies nationally, a university council meeting was told last night.

The course costs $4000 and is limited to 20 places a year. Seventy inquiries have already been received from as far afield as the United States. Students will be selected from graduates considering further study and professionals capable of making a large contribution to the Antarctic community.

All going well, the other Antarctic joint developments being investigated may lead to a centre or institute for Antarctic research and scholarship at Canterbury University, says a report tabled at the meeting.

Professor John Hay, the Woodward Clyde professor of environmental science at Auckland University, and Dr Brian Stewart, a lecturer in marine science at Otago University, will co-ordinate the programme. ❑ ***(cb Billy-Ace Baker)***

Whale Revenge

***The Fairfax (VA) Journal*, 5 June 1998, p. A2**—Oslo's *Verdens Gang* newspaper reported that a harpooned whale fighting for its life rammed the Norwegian boat that had fired on it, breaking the ship's mast and hurling two crewmen into icy waters. The paper said that the whale escaped, but none of the rescued crew members could tell if it survived. The whaling boat, *Boga*, was off Norway's northern tip when the minke whale fought back. The two men tossed into the water were in the crow's nest near the tip of the mast and had initially spotted the whale. Norway continues to ignore a worldwide ban on commercial whaling established in 1993 and plans to allow its whaling fleet to "harvest" hundreds of the marine mammals this summer. ❑ **(cb Peter Barretta Jr.)**

Meteorite Discovery

Columbus Dispatch*, 12 July 1998**—Danish public radio reported that one of the country's scientific expeditions has found traces of a meteor sighted over Greenland on Dec. 9. A trail of dust was discovered over a wide area of a glacier in south Greenland. The scientists said the meteor was so large that it may have disintegrated during its descent through the atmosphere. ❑ ***(cb Peter Anderson)

Five Dead in Russian Helicopter Crash

1 June 1998, MOSCOW (AP) - A Russian helicopter crashed Monday in the Antarctic, killing five people and seriously injuring four, Russian news agencies reported.

The MI-8 helicopter with nine people on board crashed 15 minutes after taking off from the Russian research vessel Academician Fyodorov and shortly before reaching its destination, the Russian Antarctic station Novolazarevskaya.

Crew members on the bridge of the Academician Fyodorov saw the aircraft crash, and the vessel arrived at the scene with medics within 35 minutes, the ITAR Tass news agency said.

The news agency said the four injured people were taken to the ship in grave condition. Those killed included three crew members and two members of the Russian Antarctic Expedition. ❑ **(cb Billy-Ace Baker)**

Bering Bridge Dream Won't Die

***Alaska*, October 1998, p. 15**—For more than a century engineers and entrepreneurs have been proposing a commercial overland route between Alaska and the Russian Far East. The latest visionary is Californian Ted Pollard, who told Nome's *Bering Strait Record* that he hopes to get international financing for the $250 billion project. "I believe this year it will become a reality," Pollard said. His plans include a suspension bridge—an "Intercontinental Peace Bridge"—from Wales, on Alaska's Seward Peninsula, across the Bering Strait to the Diomede Islands and thence to Russia's shore. Pollard's "Arctic Regional Corridor" also would require new roads and a railroad through western Alaska.

But a Washington state engineer who has done feasibility studies for the Russians on a similar route said it would be cheaper and safer to tunnel under the Bering Strait. "It's not a good idea to have cars on an elevated structure that can be affected by ice and high winds," Hal Cooper told *Record* reporter Mark Gillespie. ❑ ***(cb Peter Barretta)***

Breaking Through a Weather Mystery

Scientists sail into a deeper knowledge of sea ice and its effects on our climate

***USA Today*, "Science," p. 5D, 16 June 1998, by Jack Williams**—Every minute, ice claims another 20 to 30 square miles of the ocean around Antarctica.

By the end of the Southern Hemisphere winter in September, sea ice will be floating on about 7.2 million square miles of ocean, about twice the size of the USA, including Alaska.

Then, as the sun climbs higher and higher in the southern sky, the ice will melt until it covers a little over 1 million square miles of ocean in February, at the end of summer.

Scientists call the annual freezing and melting of about 6 million square miles of ocean around Antarctica the Earth's biggest annual climatic event.

Traveling to the ice is "an opportunity that is available to very few people," writes Martin Jeffries in an email to *USA Today*. He's chief scientists among the 54 men and women aboard the research icebreaker *Nathanial B. Palmer* who are the only humans to actually see it this year.

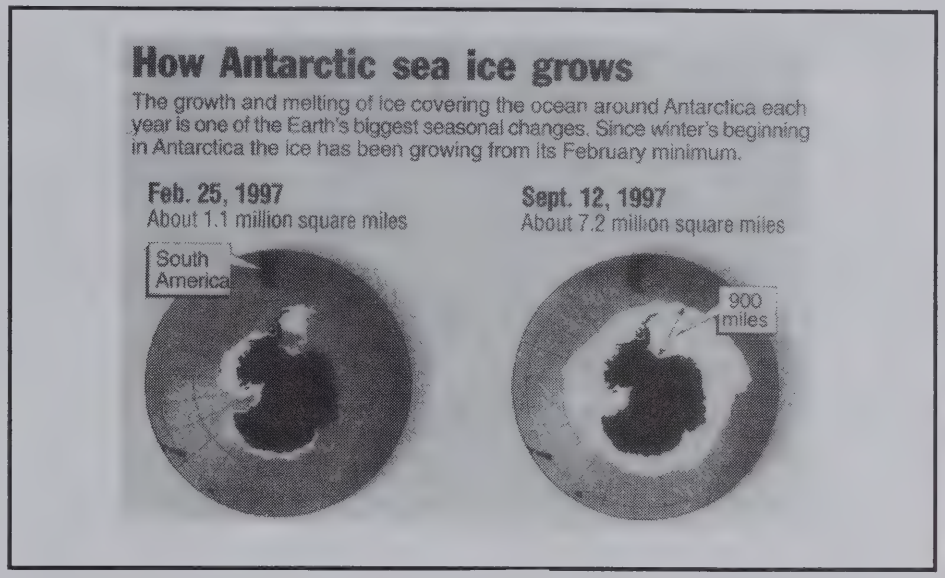
The *Palmer*, an icebreaker built to crash through the Antarctic ice with scientists aboard, left New Zealand May 1 and completed its voyage through the ice last week. It's expected back in New Zealand at the end of this week.

Scientists already have a general picture of how the ice helps drive the global ocean currents that help create climate. But they don't have hard data on exactly what happens, especially in winter.

Satellites send back daily images of the ice, but only the kind of data gathered from ships such as the *Palmer* will yield the detailed picture that scientists need.

While the *Palmer* was in the ice, scientists worked in wind-chill temperatures that would instantly freeze any patch of skin left uncovered. They drilled more than 3,000 ice core samples and measured ice depths to better interpret satellite images. They also measured the saltiness and temperature of the water and studied how the ice forms.

They hope their data will answer questions about how the ice grows and how it forms cold, salty water that affects global ocean currents. The information also will give them insight into the algae and animal life that exists on and under the ice, which will help determine how much carbon dioxide the oceans absorb.


How Antarctic sea ice grows
The growth and melting of ice covering the ocean around Antarctica each year is one of the Earth's biggest seasonal changes. Since winter's beginning in Antarctica the ice has been growing from its February minimum.
Feb. 25, 1997
About 1.1 million square miles
South America
Sept. 12, 1997
About 7.2 million square miles
900 miles

Source: Robert Grumbine, National Weather Service Ocean Modeling Branch

Pensacola News Journal

All of which should help forecasters and researchers better understand satellite images of the ice and improve the computer models used to predict both day-to-day weather and future climate.

"If you look at it from a satellite, you're never quite sure what you're looking at," says Bernhard Lettau of the National Science Foundation.

The scientists will compare the data with that obtained on another cruise by the *Palmer* three years ago, Jeffries says, giving them "a better picture of inter-annual variability of ice thickness, something that satellites cannot tell us."

This year the scientists left seven ice drift buoys, each with a global positioning system unit to radio back precise data on the ice's location. Two have instruments that send back weather information as well.

"We will be able to investigate relationships between buoy drift speeds and directions and wind speeds and directions," Jeffries says.

The effects of the annual expansion of sea ice are felt around the world. The atmosphere and oceans are always working to balance the Earth's heat budget. Without them, the polar regions would grow colder while the tropics kept on warming. The oceans do about a third of this job; the atmosphere does the rest.

The atmosphere uses storms to push warm air toward the poles and cold air toward the tropics. The oceans do their part with global currents, which are driven in part by the sea ice that forms and melts each year around Antarctica.

When the ice begins decaying in September, "the loss rate is four times the size of Maryland everyday, almost twice the size of Rhode Island every hour, and 15 percent of Chicago every minute," says Robert Grumbine of the National Weather Service's Ocean Modeling Branch at the National Centers for Environmental Prediction in Camp Springs, Md.

In the fall and winter, the ice grows as frigid winds from Antarctica blow outward from the ice-covered continent across the ocean. The ice also helps make Antarctica the coldest part of the word.

"The sea ice acts as a very effective lid on the ocean," keeping it cooler, Jeffries says. When the sun is up, the ice reflects away heat that could otherwise warm the southern ocean. The ice and the snow atop it also block heat in the warmer ocean water below from warming the air.

When the ice begins retreating in September, the sun has to melt the ice before it can warm the surrounding ocean.

No matter what the effects, Antarctic sea ice, because of its effect on ocean currents, is sure to be a major player. Actions of the sea ice could possibly slow a warming of the Earth, or speed it up.

Grumbine says understanding the details of sea ice formation and melting and its effects is vital to predicting future climate. "If we don't understand how it works now, we don't have much hope of understanding how it will change and how it will affect the climate." ❑ (cb Billy-Ace Baker)

(For more on Antarctic sea ice, visit www.usatoday.com/weather/tg/wseaice/wseaice.htm)

Toxins Threaten Lord of the Arctic

AOL News (AP), 2 August 1998, by Doug Mellgren, OSLO, Norway—Polar bears fear nothing they can see in their icy domain—but they can't see PCBs, and scientists worry the bears are succumbing to the invisible invaders.

Last year, researchers in Norway's remote Svalbard islands reported they found seven female polar bears with vestigial male organs. Research team leader Andrew Derocher says the anomaly may be caused by toxic chemicals.

Derocher, a Canadian affiliated with the Norwegian Polar Institute, will lead a team to Svalbard to try to determine whether PCBs and other toxins have affected polar bears' immune systems.

"We are going to study the Svalbard bears, which is the most polluted population in the world, and compare them with a low-end population in Canada," he said.

The Svalbard archipelago, just 600 miles from the North Pole, might seem to be about as far as possible from man's pollution.

But the islands are at a crossroads of air and ocean currents bringing pollution from distant industrial sites in Europe, North America and even Asia.

The level of PCBs—polychlorinated biphenyls—in the Svalbards is at least 2.5 times higher than in Canada's polar bear territory, Derocher said. Other scientists have reported levels of PCBs in Svalbard bears 10 times higher than in Alaska.

PCBs, chemical compounds once widely used in plastics and electrical insulation, were banned in the United States in the 1970s and are restricted under international agreements. But it takes years, even decades, for them to break down.

PCBs dissolve readily in animal fat, such as blubber, and stay there. A polar bear's favorite food is seal blubber.

Derocher and his team are headed to Svalbard for an Aug. 8-16 study in which they plan to mark and attach radio-tracking devices to 30 adult bears and up to 20 cubs and give them vaccine designed to test their immune systems.

Then, four to six weeks later, they will track down the same bears to see how their immune system responded to the vaccine.

"We want to test the ability of the immune system in these high pollution bears," he said. The results will be compared with Canadian bears to be tested next year in Wapsuk National Park.

He said the level of PCBs found in Svalbard's bears are similar to those shown to have caused damage to seals, otters and mink, ranging from short-term memory loss to sterility and a reduced ability to withstand disease.

Derocher said the Svalbards and the ice pack to the north probably sustain a population of 4,000-5,000 bears in a 100,000-square-mile area, where they have no natural enemies. The population of bears, which grow to 440 to 880 pounds, has appeared stable since Norway banned hunting them 25 years ago.

But if their immune systems are weakened or fail, that could quickly change, he said.

"If they were hit by a disease, there could be a great impact in decades, even in years," Derocher said. "It is certainly something to be concerned about," he said of the toxins. ❑ **(cb Peter Anderson and Billy-Ace baker)**

New Iceberg Is Bigger Than Delaware

The Associated Press, WASHINGTON (AP)—A giant iceberg—bigger than the state of Delaware—has broken off an Antarctic ice shelf.

The National Oceanic and Atmospheric Administration said Thursday that the berg, named A-38, broke off the Ronne Ice Shelf and is floating adjacent to the shelf.

The iceberg is 92 miles long and about 30 miles wide with an area of 2,751 square miles. Delaware has an area of 2,044 square miles.

The new berg was sighted by Mary Keller, a scientist at the National Ice Center in Suitland, Md., using satellite data.

The last known iceberg of this size to calve off a Southern Hemisphere Ice Shelf was B-9 in the Ross Sea in October 1987.

Iceberg names are derived from the Antarctic quadrant in which they are originally sighted. Quadrant A includes the Bellinghausen and Weddell seas and the peninsula extending toward the tip of South America. ❑ ***(cb Billy-Ace Baker).***

Dinosaurs in Arctic

***The Washington Times*, 20 September 1998, p. D8**—A series of footprints have recently been found in Alaska, suggesting many dinosaurs lived in the Arctic 90 to 110 million years ago.

These footprints belonging to five dinosaur species were found this summer at 13 sites over more than 60 miles along the Colville River in northernmost Alaska, said Roland Gangloff, lead author of a report from the University of Alaska at Anchorage.

Until recently, scientists had only one set of fossils proving dinosaurs lived in that area, Mr. Gangloff said.

"Now we know dinosaurs flourished in Alaska even earlier than our previous work had indicated," he said. ❑ ***(cb Peter Barretta)***

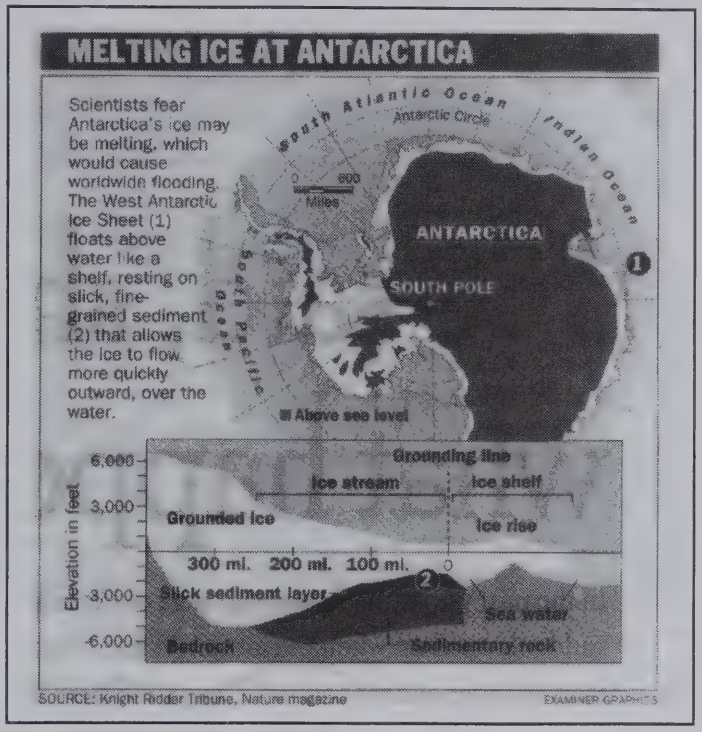
Atmospheric Shrinking

The Fairfax (Va) Journal*, 18 September 1998, p. A2**—Scientists from the British Antarctic Survey published a report saying that they have measured a five-mile drop in Earth's upper atmosphere during the past 40 years. They say that the zone is a litmus test for climate change and believe the shrinking is caused by cooling aloft linked to the global warming at the surface. The results, published in this month's issue of the *Journal of Geophysical Research*, were obtained from radio-wave-monitoring studies in Antarctica since 1958. The altitude decrease they discovered is in the ionosphere, an electricity-conducting layer of the upper atmosphere, and was similar to results obtained from separate studies in Europe. The key point here is that it's an indication something's happening to the Earth's atmosphere, but it's nothing to worry about," said Dr. Martin Javis of the survey. ❑ ***(cb Peter Barretta Jr.)

Siberian Wildfires

***The Fairfax (VA) Journal*, 7 August 1998, p. A2**—Wildfires raging out of control across Russia's Siberian region, just below the Arctic circle, have ravaged nearly 400,000 acres of taiga, according to the Itar-Tass news agency. A state of emergency has been declared in the Khabarovsk region where conifer forests lie between the Siberian steppes and the Arctic tundra. More than 1,700 troops and 400 vehicles have been dispatched to fight the blazes, but airborne assaults were impossible over the weekend due to the thick pall of smoke that blocked visibility of the fires. Authorities urged residents to remain indoors or to leave the region due to the large number of ailments being caused by the smoke. ❑ **(cb Peter Barretta)**

Ice of Antarctica May Be Melting



***San Francisco Sunday Examiner and Chronicle*, 2 August 1998, p. A-4, by Keay Davidson**—Last month, in several articles in *Science* and *Nature* magazines, scientists reported new data suggesting that parts of the Antarctic ice are falling apart faster than once thought.

The main object of concern is the West Antarctic Ice Sheet, or WAIS. It floats above water, like an extension or "shelf" projecting from the Antarctic continent.

Among the scientists' findings: Space satellites have detected Antarctic ice changes that might, at worst, "be a first step toward the collapse of the entire West Antarctic Ice Sheet," according to the July 24 issue of *Science*.

The European research satellites, known as ERS-1 and ERS-2, use radar to map the distribution of ice in Antarctica. The satellite data show that the so-called grounding line—the boundary between floating ice and ice atop the Antarctic continent—"has been retreating inland at a rate of more than a kilometer (6/10ths of a mile) per year," reports the *Science* article by staffer Richard Kerr.

Why? "Presumably because the glacier is losing mass by melting at its base," Kerr says. His article summarizes research, published in the same issue, by Eric Rignot of the Jet Propulsion Laboratory in Pasadena. Rignot was unavailable for comment.

"Now the question is when the WAIS might disintegrate as the world warms—and how rapidly it might flood low-lying coasts," says a *Science* story accompanying the Scherer report.

• Slick, fine-grained sediments beneath Antarctic coastal ice might accelerate its outflow, speeding the rise of global oceans, according to research published in the July 2 issue of *Nature*.

In the 1970s, a few researchers warned that "global warming" might melt part of the Antarctic ice sheet, which is several miles thick. As a result, they said, sea levels could rise globally.

Ever since, glaciologists—scientists who study the world's vast outcroppings of glacial ice, from Greenland to Antarctica—have warred over what's really happening in the southernmost continent.

They fall into two camps. One argues that Antarctic ice has been relatively stable over millions of years and is unlikely to undergo major collapse as the planetary temperature rises, according to geophysicist Alan Cooper of the U.S. Geological Survey at Menlo Park.

Another camp, Cooper says, argues that at least parts of the West Antarctic Ice Shelf are highly unstable and could rapidly fall apart during a major warming.

Cooper—who declines to side with either camp—says the public can learn more about Antarctic ice dynamics at a Web site: www.usgs.gov/education/animations/.

While concerned by Rignot's observations, experts caution against jumping to conclusions.

"Eric Rignot's observation does not mean that the (Antarctic ice) collapse has started; it does not mean sea level will be 20 feet higher in 100 years," says Professor Richard Alley of Pennsylvania State. "The easiest reason (for saying this) is that he hasn't watched (the glacier) very long."

Glaciers do odd things... they have a mind of their own.

"Glaciers do odd things sometimes. They flow fast, then slow down....You could anthropomorphize them and say they have a mind of their own," says Alley.

The new evidence impresses at least one veteran skeptic, Barclay Kamb, a noted glaciologist at Cal-tech.

Originally, Kamb said, "I was rather skeptical of this idea of (Antarctic ice sheet) disintegration—it seemed (to me) like a play for attention, like grandiosity."

But now, he says, the evidence for rapid ice changes is good enough that the worst-case scenarios are worth worrying about.

If the ice sheet disintegrated, "sea level would rise by about five meters, that is, about 20 feet," Kamb says. "You'd produce a lot of these huge 'tabular' icebergs, some as big as the state of Connecticut."

Scherer's work impresses John Barron, a USGS-Menlo Park geologist who studies diatoms."I think (Scherer has) proven his case" that the ice sheet changes substantially over time, Barron says. "What has been lacking is direct evidence.

"And now, he has provided direct evidence that at some time in the last 1.3 million years, there was no ice sheet over those sites."

The meteorologist Mark Fahnestock of the University of Maryland at College Park thinks it's too early to say whether the ice sheet is disintegrating over the centuries, or is just undergoing routine variations in shape and size.

But if the ice continues to melt at high speed, he says, "then maybe we will get to the point where we would call it a warning signal." ❑ ***(cb John Roscoe)***

The Legacy of the IGY

***The Antarctic Sun*, 7 February 1998, by Guy Guthridge**—December 31, 1958, was the last day of the 18-month International Geophysical Year. Throughout the world, IGY researchers were writing their papers and packing instruments away.

Except in Antarctica.

Months earlier the National Science Foundation had told Congress of "strong and compelling" scientific reasons to continue beyond the IGY and not lose "desirable continuity of scientific observations." NSF said stations had been built at great effort and expense, and other nations, including the Soviet Union were preparing a post-IGY "coordinated plan of studies."

Congress approved, and the Executive Branch agreed, that NSF should coordinate the science. The Department of Defense, remaining in charge of operations, set up a group under Paul A. Siple, South Pole's first science leader, "to develop mutually agreeable plans for cooperative efforts in the Antarctic." The National Academy of Sciences, which had funded IGY science using NSF money, at NSF's request set up an advisory Committee for Antarctic Research (now the Polar Research Board) and appointed Laurence M. Gould to chair it.

President Eisenhower on May 3, 1958, said "The United States is dedicated to the principle that the vast uninhabited wastes of Antarctica shall be used only for peaceful purposes," and invited the 10 other IGY Antarctic countries and South Africa to "seek an effective joint means of achieving this objective." After negotiations lasting more than a year, representatives of the 12 nations sat down in Washington, D.C., on October 15, 1959. On December 9, they signed a document they called the Antarctic Treaty.

An uproar ensued in the U.S. Senate. "I rise in opposition to the ratification of this treaty," echoed in the chambers. The U.S.S.R. had signed it and couldn't be trusted, the United States had failed to take possession of territory despite "solid claims to some 80 percent of the Antarctic," we would forfeit future economic potential, and nuclear explosions were banned. "We are trading what I would call a horse for a rabbit," one senator said, "to get the concessions the treaty would grant in the way of international amity and accord"

On august 11, 1960, the Senate ratified the treaty, voting 66 to 21, eight more than the two-thirds majority needed. The treaty entered into force on June 23, 1961, after the last of the 12 signing nations deposited its ratification with the Department of State.

The IGY's successful and cooperative science is universally credited with paving the way to the Antarctic Treaty. Larry Gould wrote in 1978 that "important as the scientific results of the IGY Antarctic and global programs were, in the long run it may be the human and social results which will prove to have been the most important." It was, he wrote, "Antarctica, coldest of the continents, that witnessed the first thawing of the cold war."

A *New York Times* editorial in 1969 said the Antarctic Treaty helped to create foundations of mutual confidence on which great diplomatic landmarks were based, notably the test ban treaty of 1963, the space compact of 1967, and the nuclear nonproliferation pact of 1968. Later thinkers saw Antarctic Treaty influence on the 1979 Moon treaty and the 1982 Law of the Sea convention.

Stephen J. Pyne, author of the acclaimed *The Ice, a Journey to Antarctica*, said the IGY started the third great age of discovery—the earlier ones being geography and natural history—because it undertook a geophysical inventory of the solar system beginning with planet Earth.

As people look increasingly beyond their borders for solutions to concerns from economics to environment, the Antarctic IGY is eerily visionary. Professor Gould told Congress in 1960 that "For many, many years to come, the most important export of Antarctica is going to be its scientific data." This season's projects—examining topics ranging from the origin of the universe to the fate of the ice sheet—are ongoing celebration of the IGY as scientists and support personnel commence the fifth continuous decade of research in Antarctica. ❑ **(cb Billy-Ace Baker).**

Dogged Geologist Hits Diamond Lode in Canada's Arctic

***The Columbus Dispatch*, 28 June 1998, by David Crary, YELLOWKNIFE, Northwest Territories**—For 10 years Charles Fipke chipped away at rocks strewn across some of the most desolate land in North America. His persistence paid off.

In October, the continent's first world-class diamond mine is scheduled to begin production on a tract of tundra and lakes in the remote heartland of Canada's Northwest Territories. The industrial complex is designed to operate every day for the next 25 years in harsh arctic weather, producing high-quality diamonds with a projected value of more than $7 billion.

Other mines are expected to open in the region over the next few years, and experts predict Canada soon will produce more than 10 percent of the world's gem-quality diamonds.

Fipke, a geologist from British Columbia, wasn't the first prospector to hunt for diamonds in the Northwest Territories, but he was perhaps the most dogged. Starting in 1981, he followed the path of Ice Age glaciers across the sparsely populated region, looking for tiny mineral traces in the surface rocks that would signal the presence of diamond-bearing ore underneath. It took him a decade to find what he was looking for.

The site—125 miles south of the Arctic Circle and 185 miles from the nearest supply sources in Yellowknife—is accessible only by air or by an ice road usable for about 12 weeks in midwinter.

On the political front, the mine has worked out accords with three Indian tribes and the territory's community of Inuit. The company is providing job training and scholarships to the native communities and has pledged to allocate about 30 percent of the mine's 600 permanent jobs to aboriginals.

Stephen Kakfwi, a former chief of the Dene tribe and now the territory's economic development minister, praised BHP as "a good corporate citizen" that has kept its promises on hiring and local purchasing of supplies.

The company also went through a 2-1/2-year environmental review that Vaydik, the Chamber of Mines official, described as the toughest ever for a Canadian mining project.

Some major environmental groups initially were hostile to the project, but criticism ebbed after Broken Hill detailed its conservation and reclamation plans. Key challenges include minimizing water pollution on a tract that contains 8,000 lakes and preserving a migration corridor for a heard of 450,000 caribou. ❑ **(CB Peter Anderson).**

Flying Over Ice—Pole to Pole

The American air force officer who takes over as commander of the Deep Freeze operation has a long association with the Ice, writes Deal Calcott

Even after 28 years flying experience in polar conditions, the new man in charge of United States Antarctic air support says he has great respect for the environment.

Colonel Graham Pritchard, 53, who served in the Gulf in Operation Desert Storm, is an Arctic and Antarctic specialist who has accrued more than 9,000 hours, including flying five different models of the Hercules.

The vice-commander of the New York Air National Guard's 109th Air Mobility Wing, colonel Pritchard heads the Air National Guard's Antarctic support unit.

He began his polar career with an assignment after initial pilot training to the 17th Tactical Airlift Squadron of the Alaskan Air Command at Elmendorf Air Force Base, Alaska.

His long association with the Hercules began there, and he qualified as aircraft commander in the C-130D version.

Operation Deep Freeze had its genesis in the establishment in 1955 of the United States Naval Support Force Antarctica, part of the United States contribution to the International Geophysical Year.

Responsibility for Operation Deep Freeze I fell upon Rear Admiral George Dufek, an officer experienced in Arctic conditions. He led seven ships and 1,800 men to establish an airfield and operational base at McMurdo Sound, which later developed into the famous McMurdo Station.

The first aircraft used were two piston-engined R5D Skymasters and two ski-equipped P2V Neptunes. Conditions were rugged, in many ways not much different from conditions faced by explorers Scott, Shackleton, and Amundsen 50 years earlier.

Colonel Pritchard says he enjoyed Arctic flying so much he stayed with it, and a series of circumstances allowed him to do that.

His unit, one of three in United States forces which operate ski-equipped aircraft, will support Antarctic operations from October to February. He will then head north to run support for the United States program in the Arctic from March to August.

After 28 years of Arctic and Antarctic flying, he says you cannot take anything for granted. "You're always careful, you always watch the weather, you watch the condition of the aircraft because it's a very different flying environment. You never take it for granted even when you're familiar with it."

United States ice-bound pilots train in Greenland for an initial two- to three-week period in procedures such as how to airdrop cargo and landing on skis.

Once qualified, pilots initially deploy to Greenland, then to the Antarctic, but it takes three full seasons, two of them in the Antarctic, before they are allowed full command of the aircraft.

The New York Air National Guard has 24 ice-trained crews, each comprising five personnel, and deploys five crews and aircraft to Christchurch for the southern summer. About 120 personnel work on the ice, with seven staff in Christchurch.

Colonel Pritchard says although he was experienced in the Arctic, the vastness and distances of the Antarctic are so much greater.

"You get to the edge of the continent and then it's two further hours of flying until you finally reach McMurdo. So the vastness of the continent is quite impressive."

He says despite his years of experience, he never gets tired of flying to polar regions, the area holding the same fascination now that it first did.

However, he is looking forward to a change of pace. He will retire to his home at Galway, New York, in about two years. ❑ **(Multiple contributors)**

STUDY: Montreal Protocol Beginning to Pay-Off

American Geophysical Union (AP), WASHINGTON—Increases in the ozone-destroying chemical CFC-12 in the upper atmosphere are slowing, German researchers report.

"The CFC-12 data show a continuous and rather constant increase between 1978 and the early 1990s, while a slowing down of the trend is observed after about 1990," the scientists report in a paper scheduled to appear in the Sept. 1 edition of Geophysical Research Letters.

CFC-12, a chlorofluorocarbon once commonly used in refrigerators and air conditioning systems, is one of the main chemicals found to be damaging the ozone layer in the upper atmosphere.

The depletion has been particularly severe over the Antarctic, where it gained the designation "ozone hole."

Fears that severe ozone depletion could spread to populated areas of the world led to the 1989 Montreal Protocol in which countries agreed to reduce or eliminate ozone-damaging chemicals.

Although some 165 countries have agreed to that protocol, levels of CFC-12 continued to increase as the gas escaped from old refrigerators and other equipment that remained in use.

The slowing of those increases, the new paper reports, confirms that the Montreal Protocol has become effective, though it will take years to reduce CFC levels because the chemical can remain in the air 10 to 15 years.

The study was done by Andreas Engel and Ulrich Schmidt of Johann Wolfgang Goethe University in Frankfurt and Daniel McKenna of the Institute for Stratospheric Chemistry in Julich, Germany. Geophysical Research Letters is published by the American Geophysical Union. ❑ **(cb Billy-Ace Baker)**

Activists Object to Inuit Hunt for Endangered Arctic Whale

Columbus Dispatch, **14 July 98, TORONTO (AP)**—Equipped with an explosive-tipped harpoon, two dozen Inuit in the Canadian Arctic plan to set sail this week on a mission to kill a bowhead whale. Far more than a whale's life is at stake.

If the hunters succeed as expected, they will be heroes in their Baffin island hometown of Pangnirtung, where the last bowhead whale hunt occurred in the 1940s. The feat will be celebrated across a vast region that is preparing for Inuit self-government next April as the new territory of Nunavut.

But to many marine biologists and animal-rights activists, a successful hunt will mean the needless killing of a threatened species. They view the bowhead as the victim of a misguided, politically motivated effort to revive a tradition that should have been laid to rest.

Paul Watson, who heads an anti-whaling group called the Sea Shepherd Society, denounced the hunt as "outlaw whaling" because the bowhead around Baffin island are considered endangered.

"There's a genuine desire to revive traditional cultures," he said. "Unfortunately, in the native communities, reviving culture often means having to kill something."

The Inuit organizing the hunt make no apologies. Eric Joamie, a leader of the Pangnirtung hunters association, said the hunt is a centuries-old tradition fundamental to the identity of the Inuit.

"Our ancestors were involved in harvesting any kind of animals they were able to come across for their survival," he said. "It is our right, part of our culture, to harvest any animal within Nunavut, regardless of any regulations."

Bowhead whales in the region were killed by the thousands—almost to the point of extinction—during the heyday of commercial whaling in the 19th and 20th centuries. Only a handful of bowhead were killed by Inuit during the ensuing decades as Canadian authorities imposed tight restrictions.

During land-claims negotiations preceding the creation of Nunavut, the Inuit obtained the right to resume bowhead hunting, subject to federal approval. The first licensed hunt in a generation took place in 1996 at Repulse Bay.

From the Inuit standpoint, it went badly, creating negative publicity. The whale was hit by scores of bullets from high-powered rifles, sank after dying, and did not float back to the surface for two days.

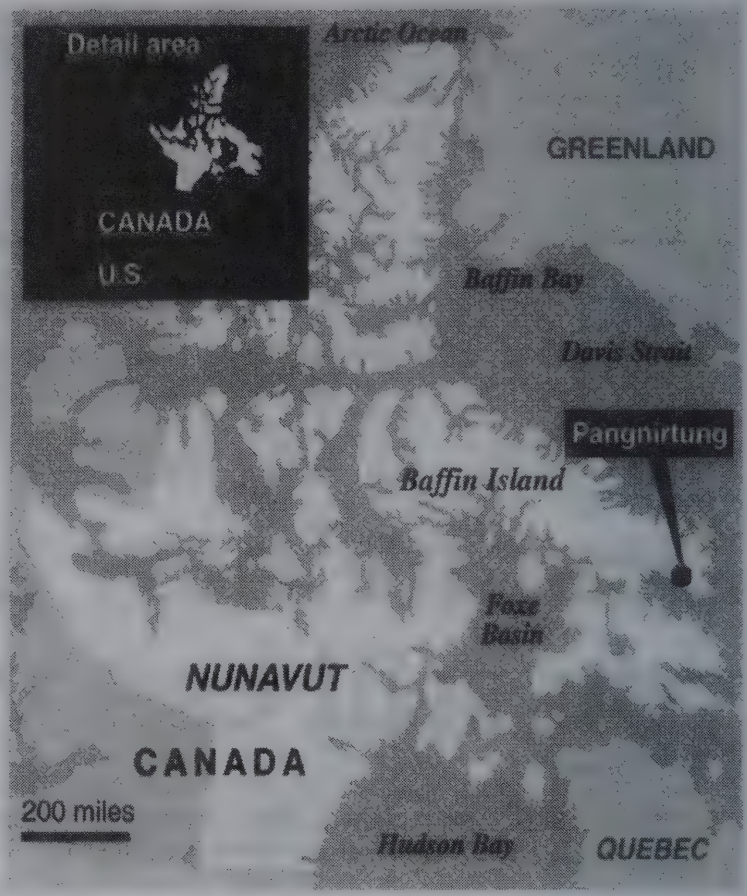
Pangnirtung leaders are determined to avoid the mistakes of 1996. They recruited the area's most respected hunters, who will not use rifles, although they will be armed with an exploding harpoon fired from a shoulder-mounted gun.

Stu Innes, an expert with Canada's Department of Fisheries and Oceans, believes the eastern Arctic bowhead population is robust enough for periodic hunts by the Inuit.

"These people have a cultural right to be first in line to hunt this animal," Innes said. ❑ ***(cb Peter Anderson)***

Whale hunt

This week two-dozen Inuit will set sail to kill a bowhead whale. The revival and success of this traditional hunt will be celebrated across the region proudly preparing for self-government. The last bowhead whale hunt occurred in the 1940s.



Ship Returns After Being Stranded in Antarctic

HOBART, Australia—A research ship limped back to Australia yesterday, its engine room blackened by fire that nearly forced scientists to abandon ship in frigid Antarctic waters.

The fire also left the *Aurora Australis* with insufficient power to heat the ship during winter in one of the coldest climates on earth.

The blaze in the early hours of July 22 ruined a pioneering midwinter expedition to study a vast polynya, an area where savage winds break up sea ice and cause heavy, salt-laden water to sink.

The fire, probably caused by a fuel leak, not only wiped out the main engine, but it also destroyed pipes and cables needed to run the second engine, which was undamaged.

It took nearly a day to restore enough power to run water and heat the ship, an icebreaker. But it was three days before new cabling and a water pump to cool the second engine were improvised. The *Aurora* spent the interim drifting in icy Antarctic waters. ❑ ***(cb Peter Anderson)***

Rising Waters

The Washington Times, **25 October 1998, p. C12**—The first accurate measurement of the Antarctic ice cap shows that the sheet is barely shrinking as a result of global warming.

But the researchers who carried out the survey using remote sensing satellites say their findings are more disturbing than reassuring.

The findings imply that the average sea level will rise over the next century by more than most scientists expected—perhaps as much as 3.3 feet—through thermal expansion of warming sea water.

The rising waters could affect millions of people who live within areas three feet above sea level, researchers said.

The sea level is currently rising by 0.72 inches a decade, but scientists don't know how much of the rise is due to melting ice caps and glaciers and how much to water in the oceans expanding as its temperature rises.

Antarctica is by far the largest store of frozen water on Earth. The satellite survey, published in the journal *Science*, implies that melting ice so far plays only a small role in raising sea level and that the effect of thermal expansion is unexpectedly large. ❑ ***(cb Peter Barretta)***

Climate Change Affects Penguins

National Geographic, **August 1998**—For more than 600 years only Adélie penguins lived along the chilly shores of the Western Antarctic Peninsula. Ornithologist and paleontologist Steven Emslie of the University of North Carolina, Wilmington, found Adélie bones in nests near Palmer Station dating from as early as the 14th century.

But two other penguin species have moved in, apparently as the result of a 50-year warming trend that has seen winter temperatures rise seven to nine degrees F and lessened the amount of ice around the peninsula. "Adélies require the edges of pack ice for foraging," Emslie says. As the ice shrinks, he believes, their numbers decline. Chinstrap penguins, which forage in the open ocean and aren't affected by ice breakup, began to arrive in the 1950s. Gentoos, normally a subantarctic species, first appeared here in 1975. The two newcomers now form a major portion of the region" penguin population. ❑ ***(cb Capt. David Moyer, USN)***

Hopes Remain of Finding Dinosaurs

The Press, **27 October 1998, CHRISTCHURCH, New Zealand**—Scientists working on the Cape Roberts Antarctic rock drilling project may come across the remains of a tyrannosaurus rex as they drill back to the age of the dinosaurs.

The first rock core for the season was recovered on Wednesday. Scientists hope coring will continue until late November through 700m of strata beneath the sea floor off Cape Roberts, 140km north of Scott Base.

Chief scientist Peter Barrett said sea conditions around the drilling platform, 15km off the coast, appeared more favourable than last year, when scientists obtained rock cores revealing a period several degrees warmer than now, between one and two million years ago.

"This time we are hopeful of coring back to the age of dinosaurs, about 65 million years ago," he said.

The rock layers under study contain fossils recording the climate of Antarctica from about 20 million to 70 million years ago, along with indications of the extent of Antarctic ice cover during the period.

Begun last year, the Cape Roberts project managed only a week's drilling and extracted 150m of core before storms threatened the 50-tonne drilling platform, which sits on 2m-thick sea ice and 150m of ocean.

Despite the rapid withdrawal, the six-nation project turned up enough rock to provide plenty of research material for the 50 scientists working at the Cape Roberts site, Scott Base and McMurdo Station.

Professor Barrett said the cores obtained this year may help understanding of global warming. At the time the cores were laid down, the earth's temperature was about six degrees warmer than at present.

"One of the things we want to know is to what extent these higher temperatures in the past have melted ice sheets and raised sea levels," he said.

Some of the drilling and support teams have been in Antarctica since August, setting up the base camp, which is built inside shipping containers, and drill rig.

The 11 drillers and nine support staff had worked in temperatures as low as minus 40degrees and occasional 50knot winds. ❑ ***(cb Billy-Ace Baker)***

US Plane Has Accident in Antarctica

SYDNEY, Australia (AP) 18 November 98—An American C-130 Hercules plane landed in a crevasse in Marie Byrd Land, Antarctica, this week, causing unspecified damage to the $25 million plane. Simon Stephenson of the U.S. National Science Foundation, speaking from Antarctica's McMurdo Base, said today that the Hercules had completed a reconnaissance flight of the ice before attempting to land. While it was taxiing, one of its skis dropped into a crevasse, which are often covered by thin layers of snow. The accident happened at an ice stream 2 1/2 hours by plane from McMurdo. There were no injuries reported among the plane's seven crew and four passengers, who were rescued by another plane. It was not clear exactly when the plane became stuck. Stephenson said he didn't know whether the damaged plane would be removed from the isolated spot this year, but added that salvagers would return next year if necessary. "It's pretty safe where it is," said Stephenson. "Nobody's going to touch it, and it's not going to move." The plane was one of five operated by the Air National Guard of New York. ❑ **(cb Billy-Ace Baker)**

Japanese Whalers Rally Antarctic Whale Ban

Associated Press, 15 November 1998, by Erid Talmadge, TOKYO—Dancers acted out a hunt and a crowd of several thousand munched on whale meat Sunday as Japan's dwindling whaling industry rallied for an end to the international ban on their trade.

The rally, supported by the whaling industry and the Japanese government, was held to coincide with the winding down of the hunting season around Japan's coasts and the recent departure of Japanese whalers for Antarctic waters.

Japanese whaling advocates say there is no scientific basis for a continued blanket ban on commercial whaling, and cite data suggesting there could be as many 760,000 minke whales.

Annual takes of a few thousand minkes would not pose a threat to their survival, they say.

Environmental groups, however, counter that marine mammals are notoriously hard to count and that whales should not be hunted because they are intelligent. ❑ ***(cb Billy-Ace Penguin Baker)***

Book Reviews

Polar Journeys: The Role of Food and Nutrition in Early Exploration

by Robert E. Feeney. 1997. American Chemical Society (Wash. D.C) and University of Alaska Press, Fairbanks. 279 p. Cloth binding (ISBN 0-8412-3349-7) or paperback (ISBN 0-912006-97-8).

Review by John Splettstoesser.

Bob Feeney is well-known around McMurdo for his work on enzymes and proteins in penguin eggs and also his interests in the ability of organisms to withstand subfreezing conditions (e.g., ice-fish). He spent six seasons on the Ice, beginning in 1964 and, as a result of his work there, produced a spin-off, this book on survival in the cold, specifically related to food and nutrition. An earlier book, *Professor on the Ice*, is an overview of his work there while a Professor of Biochemistry at the University of California-Davis. This book on food and nutrition is two books in one—expedition history and the role of food in the successes or failures of expeditions.

The author did considerable work in gleaning appropriate polar literature in order to find details of selected major expeditions and the parts that food and nutrition played. As a result, we find that Capt. Robert Scott, in his Antarctic expeditions and quest for the South Pole in 1911-12, believed that scurvy was due to spoiled foods.About 1750 Dr. James Lind, a British surgeon, found that lemon juice could cure scurvy, although the discovery wasn't widely accepted until much later. Capt. James Cook took sauerkraut along on his expedition in the South Pacific in 1768, and the vitamin C in this food was instrumental in preventing scurvy in the crew. About 1900, it was discovered, somewhat by accident when here was nothing else to eat on expedition ships, that rats on the menu prevented scurvy because rats synthesize vitamin C.

Expeditions which are highlighted in chapters with regard to food and nutrition include Stefansson, Franklin, Nares, Greely, DeLong, Peary, Cook, Armundsen, Mawson, Scott and Shackleton. The ultimate experience in some of these expeditions also includes discussion of cannibalism. Problems with Hypervitaminosis A is covered separately in an appendix. Polar bear and husky dog livers were known for many years to be toxic in this regard when taken in large amounts.

Other major discoveries and their application that dramatically changed the health and well-being of polar explorers included the development of canning by Nicholas Appert in 1812, and the discovery by Louis Pasteur in 1885 that microorganisms caused food to spoil. Not all the innovations in canning were successful, however, as shown by the problems related to lead solder in the canned foods taken by Sr. John Franklin in his expedition to search for the Northwest Passage beginning in 1845. Autopsies made later of some of the corpses showed high levels of lead, and it is thought that the lead caused errors in judgment of the men, contributing to their deaths.

Prof. Feeney's book deserves to be read, not only by the polar book buffs, but by those looking for a somewhat different approach to the way expeditions were conducted, and the wise, or unwise, choices made in food selection. The numerous photographs are mostly from the expedition books discussed and are in black and white, therefore losing a bit in resolution. The "gremlins" that creep into all printed material are also here, but few in number, e.g., a few misspellings, etc. An 11-page bibliography leads the reader to extended details of the subjects herein. ❑

Of Dogs and Men

By Kevin Walton and Rick Atkinson (editors). 1996. Malvern: Images Publishing. 190 p., illustrated, hardcover. ISBN 1-897817-55-X

Review by John A. Hays
Scott Polar Research Institute

The strengths of this book, and they are great indeed, are that it has 177 photographs, a similar number of pieces of text, and that contributions to the whole have been made by some 65 people. It is about 900 dogs and their relationships with members of the Falkland Islands Dependencies Survey (FIDS) and its successor, the British Antarctic Survey (BAS), who used teams of these dogs to travel about 336,500 miles to extend knowledge of the Antarctic.

For those who have been to the Antarctic and, for a period of their lives, have made the Antarctic a way of life, enhanced by the presence of dogs, this book will provide a great deal of satisfaction. And those, too, who many not have had the Antarctic experience, but who value the relationship that builds between animals and humans bent on the same endeavor, will also find much in this book that will both make them laugh and give them a lump in the throat. But there is one characteristic that overwhelms all others—the sense of humility that seems to pervade the relationship between dogs and men that it describes. It is the withdrawal from Antarctica of that sense of humility and responsibility for something beyond men's own survival that constitutes the shortsightedness of current political decision to remove the dogs. Maybe the time would have come when there would have been no more huskies in the Antarctic, but it is hard to justify their permanent exclusion.

Kevin Walton and Rick Atkinson have done us a service by bringing together so many eyes and voices in telling us the story of dogs and men in the Antarctic. No other means would have been so effective. ❑

Letter to the Editor

To the Editor:

I was particularly happy to read that Kenneth Utuayuk Toovak has been nominated to be an "Honorary Member" of the Society. This stirred pleasant memories for me, as Mr. Toovak played such an important role in some of my field studies at Barrow a long time ago. The events were:

I was in Barrow in early September 1968 to attend the dedication ceremonies of the Arctic Research Laboratory. On the evening of 7 September, Mr. Toovak brought a pail of sea water to the laboratory for someone to look at, as he had noticed that there were large patches of "deep red" water along the coastline by Barrow. As he had never seen or heard of such "red water" close to Barrow, he had the initiative to wade out, collect a sample, and bring it to the laboratory for someone to examine. It was purely by chance that I was in the laboratory and thus had the opportunity to see these "red tide" organisms under the microscope. The causative organism (a large ciliated protozoan with chlorophyll-containing endosymbionts) was so unusual that Dr. Brewer and others in the Naval Arctic Research Laboratory helped organize a field program the next day in which we used aircraft to survey the extent of the bloom and a boat to obtain biological and optical data in the upper water column. The causative organism of this bloom was unknown in the literature and was described in a manuscript entitled "A Ciliate Red Tide at Barrow, Alaska," which was published in Marine Biology (vol. 7(1), 37-46, 1970) by O. Holm-Hansen, F.J.R. Taylor, and R. J. Barsdate. In the acknowledgements of this paper, the authors gratefully acknowledged Mr. K. Toovak for his interest in this work and for his help in the field program.

The honor you bestow on Mr. Toovak is richly deserved.

Osmund Holm-Hansen
Scripps Inst. of Oceanography

OBITS

Charles G. Wilber

FALMOUTH, Mass. (AP) - Charles G. Wilber, who led Arctic expeditions and taught at several universities, died August 6, after a sudden illness. He was 82.

Wilbur was a member of a joint study group of the National Academy of Sciences and the Air Force.

At the time of his death, he was a professor at Colorado State University, director of its forensic science laboratory and chairman emeritus of the department of zoology.

Wilber led Arctic expeditions in 1943 and 1944 to study the effects of cold on the human body. He had been a physiologist with the Army Chemical Corps and retired from the Air Force with the rank of colonel.

Andrew Croft

***San Francisco Chronicle*, 4 July 1998, p. C2, LONDON (AP)**—Pioneering Arctic explorer Andrew Croft, whose knowledge of cold climates proved invaluable to the British military during World War II, died in London on June 26. He was 91.

Mr. Croft first became known in 1933 when he joined the world's longest self-supporting dogsled expedition, trekking across Greenland with explorer Martin Lindsay. The trip, originally greeted with skepticism, eventually made history.

When World War II began, Mr. Croft's cold-weather expertise proved invaluable during the assignments in Norway and the Shetland Islands, defending against the Germans. In 1941, he worked as a special operations executive, an intelligence-gathering job, in Stockholm.

On the Mediterranean front, Mr. Croft's commando units bombarded the coasts of France and Italy. In recognition of his courage and planning during these raids, he earned the Distinguished Service Order, a British award for gallantry. He ended the war an army colonel.

As the start of the Cold War in the late 1940s heralded new challenges for Western armies unaccustomed to the long, cold winters in the Soviet Union and North Korea, Mr. Croft led training operations in Canada, where conditions matched those in the East.

Queen Elizabeth II appointed Mr. Croft an Officer of the British Empire in 1970 for his work with young soldiers. ❑ **(cb Joe Rychetnik)**

Mapmaker, NAACP Leader William B. Cooke Dies

***Washington Post*, 6 August 1998, p. D6, by Claudia Levy**—William Branson Cooke, 71, a U.S. Geological Survey cartographer whose work in mapping the craggy face of Antarctica was recognized in 1994 when a bluff in the Victoria Land region was named in his honor, died of congestive heart failure Aug. 3 at Providence Hospital. He lived in Washington, where he was president of the NAACP and helped plan some of the city's major civil rights demonstrations.

Mr. Cooke began his 36-year career in 1951 in the survey's branch of special maps. He came to specialize in Antarctica early on.

He was supervisor of an 18-person unit that prepared charts from Aerial photos of Antarctica's mountain ranges, glaciers and frozen lakes. Later in his career, Mr. Cooke and his cartographers relied increasingly on satellite data.

After Mr. Cooke retired, continuing as a consultant, the survey moved to honor his contributions to the mapping of Antarctica. Officials asked the U.S. Board on Geographic Names to name an ice-covered bluff between two glaciers, in the region on the west shore of the Ross ice shelf, after the longtime supervisor.

Uncharted areas on the continent are often named for cartographers and others involved in mapping there, according to Alden Warren, a veteran Geological Survey scientific and technical photographer who worked with Mr. Cooke. Mr. Cooke was unable, however, to take the survey up on an offer to fly him to Antarctica for a look. He never saw the continent he came to know so well, but kept up his membership in the Antarctican Society. ❑ **(cb Peter Baretta)**

Retired Capt. John Cadwalader

***Philadelphia Inquirer*, by Andy Wallace**—John Cadwalader, 88, of Blue Bell, a retired Navy Captain and descent of an early Philadelphia family, died Sunday at chestnut Hill Hospital. He had suffered a stroke two weeks earlier.

Mr. Cadwalader was an English teacher at the University of Pennsylvania for five years before entering the Navy in 1940. He spent World War II in the Pacific as an officer on the battleship Washington and a gunnery officer on the USS Monterey.

After the war, he received a doctorate in English literature at Penn but did not return to the classroom. Instead, he returned to the Navy.

He was a U.N. observer in Kashmir in 1951, then spent four years with the Naval Support Force in Antarctica.

In southern summers, he was aboard the icebreakers *Eastwind* and *Westwind*, helping prepare for and follow up on the International Geophysical Year in 1957-58, when a worldwide effort was made to study the physical properties of the Earth, its magnetism, gravity, atmosphere and oceans.

In 1962, he was a commander of Project Coldfeet, an intelligence-gathering mission to an abandoned Soviet scientific station in the Arctic for the Office of Naval Research.

He was a former board member of the Indian Rights Association, the Library company of Philadelphia, the Historical Society of Pennsylvania, the Sophia B. Coxe Charitable Trust, St. Peter's School, the Friends of the University of Pennsylvania Library, and the vestry of St. Peter's Church.

He is survived by his wife, Lea Aspinwall Cadwalader; sons John, George, David and Gardner A.; daughter, Sandra L.; seven grandchildren; and four great-grandchildren. ❑ **(cb John Brown)**

ANNOUNCEMENTS

Amundsen-Scott South Pole Station 1979-1980 Winter-Over Crew 20-Year Anniversary

Contact:
Mike Savage at mlsavage@clear.net.nz
or
http://members.tripod.com/~AntarcticNet
or
22 Firth Terrace, Karori, New Zealand

We are asking for alumni assistance in coordinating the display of memorabilia at the reunion. Careful attention to detail will be needed to properly obtain, display, and return these items. Volunteers are needed to form an alumni memorabilia committee to handle all this, as the squadron will be ill-equipped to do so from McMurdo.

For reunion plans or to volunteer for the memorabilia committee, please contact per the above.

USS GLACIER (AGB-4) ASSOC. Fourth Biennial Reunion

Date: September 22-26 1999

Reunion Site: Radisson Hotel (Airport)
St. Louis, Missouri

Contact:
James A. Tinch, Pres., AGB4 Assn.
901 Chestnut Street
Livingston, TN 38570-1606
1-800-483-7938, PIN 81
or agb4@ussglacier.com

VX-6/VXE-6 Disestablishment and Reunion Update

WHO:
All present and former squadron personnel, friends of the squadron, and everyone else who would like to join us in celebrating the squadron's 44 years of Antarctic service.

WHAT:
Formal Disestablishment Ceremony followed by a Reunion Picnic

WHERE:
NAS Point Mugu (Oxnard, CA)

WHEN:
27 March 1999
11:00-12:15 — Ceremony
12:15 —Dark Picnic/Reunion

Contact:
Mike Neckerman, (805) 989-8199
or
"http://www.navy.mil/homepages/vxe6"

USCGC Eastwind Association

Reunion at Ramada Inn,
Logan International Airport
Boston, MA, on 28-31 May 1999

Contact:
Earl T. Ellis, Jr., Newsletter Editor
37-C Jefferson Drive
Maple Shade, NJ 08052
(609) 667-0320 Fax: (609) 234-2592
Email: eellis@voicenet.com

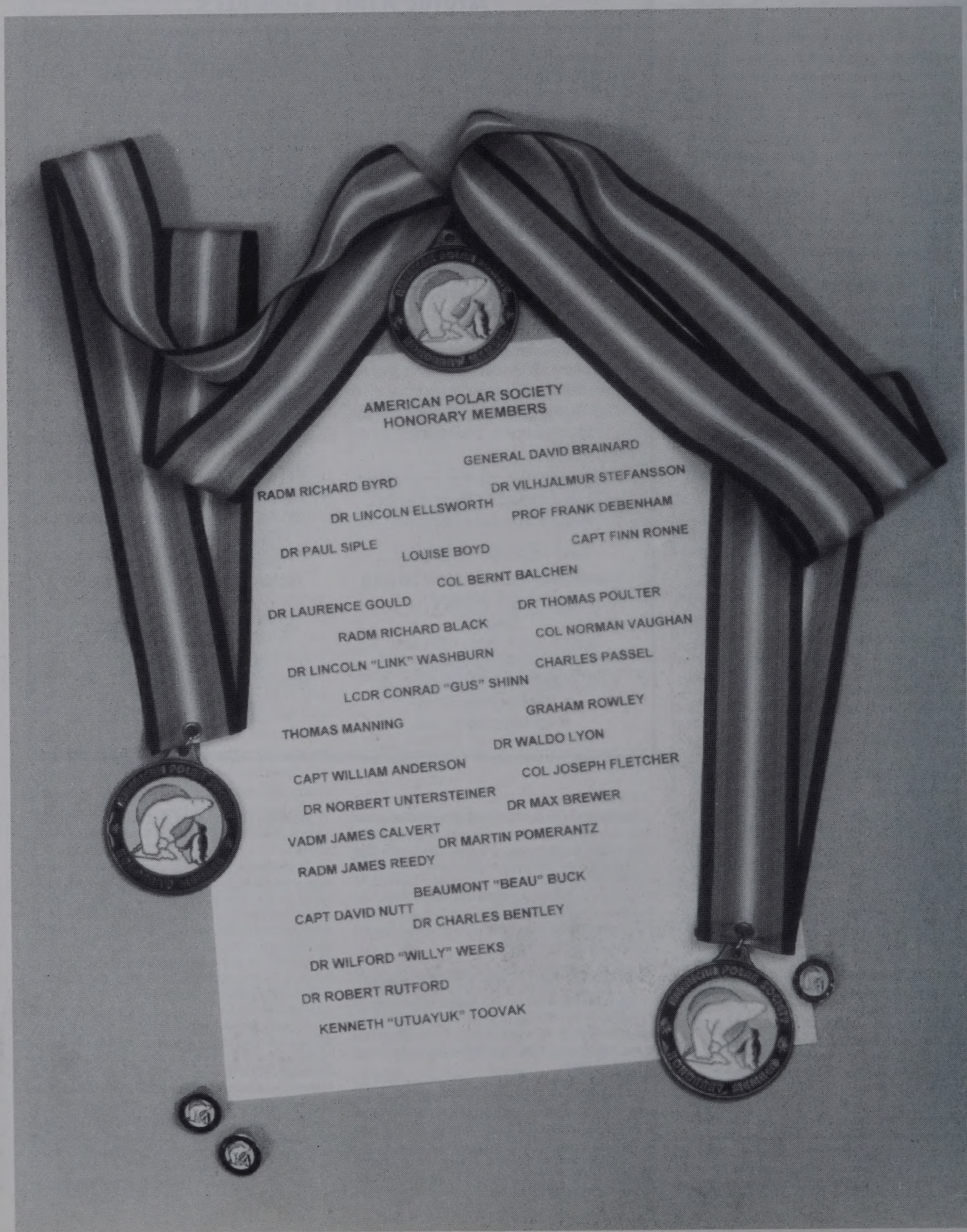


Photo Art by Memo Jasso